Project Manager's Handbook

Applying Best Practices across Global Industries

David I. Cleland and
Lewis R. Ireland

PROJECT MANAGER'S HANDBOOK

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Applying Best Practices across Global Industries

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PREFACE

A significant body of book literature in project management has evolved over the last 50 years. This body of literature addresses a wide variety of approaches reflected in paradigms, concepts, philosophies, techniques, processes, and strategies needed for use in managing projects.

In general, the existing books provide for a generic blend of the theory and practice of project management with an emphasis on "how to do it" in the management of projects, and a few large integrated books designed for teaching in undergraduate and graduate project management courses in universities, In recent years there has been a wave of short books whose focus has been on presenting summary prescriptions for "how to manage projects." Many of these books have been on the "hot topics" of the discipline such as The Project Office, Value Added Management, Portfolio Management, and Project Leadership to name a few.

What is needed is a book that presents how project management is applied in the different industries and environments in which the discipline is used. Of course many of the books deal with project management in traditional applications such as the construction, defense, and aerospace industry. Yet today, the application of project management as a philosophy and process for the management of change within contemporary organizations is spreading to nontraditional uses. Some of the newer applications of project management include information technology, software engineering, health systems, organizational renewal and realignment, mergers and acquisitions, banking and financial institutions, manufacturing, outsourcing management, and Federal, State, and local governmental units to name a few. What is needed in the field is a comprehensive book dedicated to the presentation of paradigms for the application of project management in the many different contexts in which it is found. Such a book does not exist. This book, *Project Manager's Handbook: Applying Best Practices across Global Industries,* is a "first of its kind" in the project management literature.

We believe that this book will set a trend whereby there will be more focus in literature on how project management is applied in industries and governmental agencies. The study of actual application of project management techniques and practices will result in better results for projects and greater productivity. The results of studying project management applications will be transferred to teaching institutions for a better understanding of and education in the discipline.

David I. Cleland, Ph.D.
Lewis R. Ireland, Ph.D.

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ACKNOWLEDGMENTS

Many people made this handbook possible from the initial idea through publication. Chapter authors contributed their knowledge and experiences by preparing individual chapters and deserve special recognition for sharing project management applications. We are deeply indebted to these chapter authors.

Special thanks to Dr. Bopaya Bidanda, Chairman of the Industrial Engineering Department, and Dr. Gerald D. Holder, Dean of the School of Engineering of the University of Pittsburgh, who provided us with the needed resources and the intellectual environment to develop and produce this handbook.

We deeply appreciate the many stakeholders in the project management community with whom we discussed this book for their guidance and critique of the objectives and purposes that we planned for this handbook.

Special thanks to Larry Hager, Senior Editor, McGraw-Hill Professional, whose insight of the need for this book, and his patience during its creation, provided us with considerable encouragement.

We thank Lisa Dominiak of Clarksville, Tennessee, for her administrative assistance in preparing and formatting material in the development process. Her help was especially valuable.

Finally, we acknowledge the people who use this handbook, and hope that they will find it a valuable resource for the improvement of their project management competencies.

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INTRODUCTION

The project management people authoring chapters in this handbook are knowledgeable, experienced professionals who have written their chapters from the practitioner's viewpoint. Where appropriate, experienced consultants and academics have been selected as contributors to the book. This balance of perspectives from 14 countries gives readers insight into how the project management discipline which is applied across national boundaries in several industries.

The principal guiding criteria for the authors in preparation of chapters were: (1) light on the theory and heavy on the practice of project management; (2) a description of the industry or environment in which the discipline was practiced; (3) a citation of the "lessons learned" in the use of the project approach; (4) a description of what could have been done differently in the management of the project; and (5) how the cultural ambience of the stakeholder community was impacted by the use of project management. The authors were given wide latitude in preparing their material and describing their knowledge and experiences in the application of project management.

This book is organized into six parts as follows:

Part 1 Examples of Projects Found in Specific Countries
Part 2 Examples of Projects from Specific Environments
Part 3 Project Management Government Organizations
Part 4 Project Management Organizational Functions
Part 5 Remedial Projects
Part 6 The Theory and Practice of Project Management

Each part brings together for the reader the generally related topics and facilitates finding of specific areas of interest. Furthermore, it allows study of specific applications of project management in different environments such as country, industry, and governmental agencies. It is anticipated that the lessons learned in this book will be transferable across industry or agency lines to advance the application of project management practice. A brief outline of the parts and chapters follows.

Part 1 Examples of Projects Found in Specific Countries

Several National projects are described in this part from different countries in the world. These projects have been selected as being most representative of projects that have been undertaken to manage change in the societies involved. While there is a central theme of generic project management in these projects, there are provincial characteristics to be found as well.

In Chapter 1, S. Srinivasan, Jain Chinmay, and Bopaya Bidanda examine the project management practices and issues in the Indian Software Industry. India's leadership position in the global offshore Information Technology (IT) industry is based on several main advantages such as an abundant talented professional workforce, the creation of an urban infrastructure that has fostered several IT centers in India, the ability to provide operational excellence, and a continued growth in the domestic IT sector. India faces major challenges in order to continue its dominance in the software industry. The authors end their chapter with a description of the challenges that India faces.

In Chapter 2, Brian R. Kooyman and Jonathan Shahady describe the application of project management to the bid for and conduct of the 2000 Olympic Games in Sydney, Australia. The authors include a summary of what was achieved for the games as well as other positive changes coming out of the successful games. At the end of the chapter they provide a summary of some of the major lessons learned from the application of project management to the 2000 Olympic Games.

In Chapter 3, Stephen Harrison gets the reader's attention by describing some key behaviors and attitudes that must be overcome for project management to be successful. He then introduces some approaches that have been implemented that do make a positive difference for the successful introduction and propagation of a meaningful and successful project management strategy. The chapter author concludes that projects require effective management, and that Earned Value Management and Stakeholder Management help to address the cost, schedule, technical performance objective, and the importance of the human element in the management of a project.

In Chapter 4, Professor Christophe Bredillet presents an evaluation of major infrastructure projects in France from a project finance perspective. After setting up the "project finance" scene, he provides a tentative definition of "project finance" showing the multiple facets of the concept. Professor Bredillet then compares the "Anglo-Saxon" and the "French" approaches in the management of projects. His chapter conclusions include an overview of the different legal techniques for public-private partnership in France.

In Chapter 5, Alfonso Bucero looks at the role of project management in Spanish projects. He notes that there are many good project managers in Spain, but notes that upper management support is not a common behavior observed in most Spanish projects. Unfortunately many upper managers believe that project management is a tool, which causes them to lose interest in the discipline. The belief that projects are related only to project managers is an all too common factor for many Spanish organizations.

Part 2 Examples of Projects from Specific Environments

In this part select projects are described from different environments, such as a particular industry. The reader will recognize that the theory and processes used in the management of the projects are similar, yet there are some distinguishing characteristics that can be found. These characteristics reflect the particular needs of an environment used in the strategic management of the projects. For example, a construction project requires a project management philosophy somewhat different from that to be used in another environment, such as in the financial industry.

In Chapter 6, Robert Youker describes the use of project management in The World Bank and Governmental and Non-Governmental Organizations. He shows that these projects are different from other type of projects and the reasons why the differences exist. The author describes the characteristics of International Projects, why such projects are different, and some of the expected problems to be encountered in managing such projects. He concludes that even some International Development projects are complicated, and success depends on utilizing standard project management processes and bringing together objectives and activities with the local stakeholders.

In Chapter 7, Miles Shepard opines that businesses have become more "international" in scope as a range of economic and political barriers have been reduced. He further notes that organizations are conducting their normal work across much greater geographic distances. As business strategies become managed across borders, projects are regularly conducted across international boundaries as well. He summarizes that the Trans-National Project managers need to be aware of the impact of national culture and national differences on the project and on the project team, as well as other stakeholders involved.

In Chapter 8, Beaufort B. Longest, Jr., provides the reader keen insight into how private health entities or public-sector health entities are replete with a great variety of projects. Projects in these environments exist to achieve a specific health care strategy such as in cancer, cardiac rehabilitation, geriatrics, seatbelt use, healthier eating, or safe sex practices. The author provides an integrative model of managing projects in health environments. The author concludes that logic models provide road maps of how health projects are intended to work.

In Chapter 9, Clayman C. Myers, Jr. describes on how best to conduct training in project management. Such training must emphasis the cultural differences, particularly in the training of foreign nationals. Also special challenges exist for the logistic, lodging, and subsistence matters needed for the support of the training. He notes that special emphasis must be paid to the Human Resource Management and Communication Management portions of the project management knowledge areas.

In Chapter 10, Hiroshi Tanaka provides insight into the cross-cultural project management on major global oil and gas projects. He examines some of the key challenges in managing such projects such as balancing the interests of otherwise competitors in the industry, who are partners to a joint venture. Of considerable importance is the complexity of the many corporate and geographical components in the project organization. He ends the chapter with a litany of lessons learned in the management of a joint venture project organization.

Part 3 Project Management Government Organizations

The U.S. Government agencies have played a significant role in the development of project management. The U.S. Department of Defense (DoD) developed and used project management in the early days of the evolution of this discipline. Today, the theory and processed used in DoD has become sophisticated, spreading to project stakeholders in the Defense and supporting organizations that do business to support U.S. Defense Policy. The success of project management in supporting governmental goals and objectives has spread to its use in other Federal Governmental Agencies, and to State and local governments.

In Chapter 11, Thomas R. Rhodes describes how The National Institute of Standards and Technology (NIST) operates and how project management is used in that organization. Most of the projects used in NIST are scientific and technical in nature encompassing a broad range of disciplines and interests. Projects are often done in collaboration with external partners from industry, academia, or other government agencies. The author provides a summary of the life cycle phases of a NIST technical project, as well as a description of practical considerations and guidance for effective project management in NIST projects. The material presented in the chapter is particularly useful for any existing or future stakeholder to review prior to joining a NIST project.

In Chapter 12, Sean E. O'Hara presents a summary description of the elements of project management success at the U.S. Central Intelligence Agency (CIA). A distinction is made between project management at the CIA and the Private Sector. How to manage project stakeholders, budget, and project schedules are presented along with the role of the project manager as a leader, and the project management methodology used in the CIA. The chapter author ends with a statement of the deep appreciation the author has for the opportunity to manage projects in an unbelievable organization, and to implement measures to improve the success of the agency's projects and project managers.

In Chapter 13, Tim Jaques and Jonathan Weinstein describe how project management is used at a State Governmental Unit. The authors start the chapter with an explanation of how state governmental agencies are connected to each other through a network of legislative programs, technologies, services, and customers. No two state governments are exactly alike, which affect the way that management is implemented. The authors close the chapter with a citation of some of the critical challenges faced by agencies and States.

In Chapter 14, Young Hoon Kwak provides an evaluation of the project management effectiveness in the Boston Big Dig Project and the Three Georges Dam Project in China. The goal of this chapter is to identify the opportunities and lessons learned for implementing and improving project management practices for large engineering and construction projects. Any project stakeholder on a large engineering and construction project could benefit greatly by reading this chapter.

In Chapter 15, Mike Fisher and Jang Ra assess project risk management for Alaska oil and gas capital projects. The chapter reviews and identifies risk classification and potential positive and negative risks for use in managing project risk in oil and gas projects. The paper synthesizes a risk breakdown structure and a risk register with remediation strategies that can be used as a checklist in project risk management processes for future oil and gas capital projects.

Part 4 Project Management Organizational Functions

The workings of any organization usually can be described in terms of the production of goods and/or services, the marketing of these goods and services, and the supporting financial services to produce and market the organization's output. To remain competitive the organization has to provide financial investments to advance the state-of-the-art of its goods and services as well as the efficiency and effectiveness with which the organization's output is sustained and improved. In this part, chapters will present how such organizational improvements can be developed and implemented through the use of project management.

In Chapter 16, Randall L. Speck examines the legal considerations in managing a nuclear plant decommissioning. He notes that in large, complex projects the consequences are often calamitous for cost, schedule, and quality objectives. Even with litigation, which usually provides no more than a Pyrrhic victory, even the nominal winners incur crippling loses. However, the chapter author emphasizes that legally defined contractual relationships and the means to resolve legal disputes can help the project manager, but will not compensate for inadequate planning, organization, and control.

In Chapter 17, Gregory A. Garrett takes the reader on a journey to examine a new application of project management, vis-à-vis, to improve outsourcing strategy and business results. The author discusses what it takes to create and leverage a project management discipline across multiple parties involved in planning and executing complex projects in an outsourcing environment. The author introduces the Integrated Project Management (IPM) Life-Cycle and IPM Model as a primary means to improve outsourcing strategy and business results.

In Chapter 18, Paul Varella and Kam Jugdev describe how companies are turning to project management to help them to become more effective and efficient. The authors provide an overview of how frameworks in strategy are complementary to project management. Then, the authors discuss how project management affects the design of business strategies. The authors end the chapter with a citation of five guidelines for readers to consider in assessing the opportunities for the integration of strategic management and project management.

In Chapter 19, Robert Chaves takes an informed look at the processes involved in the establishment of the project management office (PMO). By drawing on his experiences in creating and running a PMO in Financial Services Companies over the last ten years. He provides a succinct and important contribution to the growing literature on the PMO. One of his important conc1usions is that a key component of successful organic PMO creation is an early, clear definition of the PMO's contribution to the corporate value stream.

In Chapter 20, Mark Heitkamp and Lee Pinkerton provide a description of the evolution of project management office (PMO) and portfolio management at the American Modern Insurance Group. Prior to the authors' evaluation, they provide a summary of the typical project categories within an insurance company. The company's PMO manages projects that are primarily focused on building business capabilities. Today the PMO in the company is a well-established service unit. The goal of the PMO is to be viewed as an internal consulting organization that provides project management processes reflected in disciplined activities, methods, practices, and role definition—used in project development.

Part 5 Remedial Projects

In this part, Remedial Projects are described. The examples used in this part include a summary analysis of how well certain projects have been managed. Some of these projects had major cost and schedule overruns. Other projects describe how disaster recovery has been facilitated by the use of a form of project management, such as in the Hurricane Katrina disaster. The reader should gain an appreciation of the characteristics typical of both "well managed" and "poorly managed" projects.

In Chapter 21, Jim Burton describes the Hurricane Katrina national disaster when the entire U.S. Gulf coast and the subsequent levy failures in New Orleans caused unprecedented social, economic, and environmental sufferings. The United States social failures and disaster preparedness shortcomings were exposed for examination by media, government, and citizens. Burton focuses on the organization, practices, and results of the Southern Baptist Disaster Relief (SBDR) logistics and planning strategies in light of Hurricane Katrina, one of the United States' major natural disasters.

In Chapter 22, Bud Baker provides insight into the Firefly training aircraft fiasco, a case study in a project management failure in the U.S. Air Force. The Air Force spent $40 million for an ill-advised effort that was largely the vision of its most senior leader, and the results were a tragic string of accidents fatalities. Following three fatal crashes and six deaths, the Firefly aircraft were grounded and then destroyed. The author concludes that the lessons leading to the project management failures of the Firefly aircraft project apply to all projects of all sorts within organizations.

In Chapter 23, Marty Burke presents his assessment of one key aspect of project management that suffers neglect vis-a-vis inadequate Transition Management Strategy. The author's purpose is to communicate an appreciation of what Effective Transition Management is about. He closes the chapter with the statement that it is vital to track the life of the project as it goes through its various phases—and that careful documentation of the lessons and practices learned will help to ensure both success of the project, the product, and the organization.

In Chapter 24, Xue Yan and Qian Fupei provide an overview of the management of the China Shenzhou Spaceship Project. In 1992 the Chinese government initiated the manned spaceship project with the objective of making an historic breakthrough in manned spaceship development in China. The key outcomes of this project were to execute manned space travel, accomplish accompanying research, and understanding the key technology of manned spaceship travel. Other important outcomes were to develop a modern large spaceship project management model. Finally, a book monograph of the project was published to document the lessons learned on the project for future project teams to use.

Part 6 The Theory and Practice of Project Management

This part presents a management philosophy of the theory and process of project management, treated as a useful model of how best to manage the application of project management to support organizational strategies. Some of the important systems to support the successful use of project management are described such as information systems, scheduling systems, and portfolio management systems. In addition a few of the characteristics of the cultural ambience of the environment in which the projects are conceptualized and managed will be presented.

In Chapter 25, Brane Semolic and Jure Kovac writing from the perspective of their country of Slovenia present project management as related to entrepreneurship and network organizations. They make the important point that projects and project management are the primary tools for the management of development and the adjustment to changes in the business environment. They also believe that the linkage between set-up of network business connections and the project approach is the most optimal solution. They further believe that the project mode of work represents the fundamental form of the functioning of networked organizations.

In Chapter 26, Brigitte Schaden examines the role of Project Management Certification. She offers general answers to the question of why people get certified. What is the benefit? And is there any impact of project certification on the individual's daily project business? The author participated in an online survey in Austria. The results of that survey, along with the author's comments form the basis for the message sent in the chapter. A careful reading of this chapter on how the survey was conducted and how the results were analyzed is most helpful to the person wishing to improve their knowledge and attitudes about the role of project management in modern organizations.

In Chapter 27, David Holyoke discusses the role of the chief architect in software development projects and how taking an "architectural approach" is a key success factor for any type of project. He believes that the role of a chief architect, or its equivalent, is critical to successful project management. He notes that the ability to create synergy is in the job description of the chief architect. It is no different in the role to be expected of the project manager.

In Chapter 28, Donna Fitzgerald describes the development strategy behind what has become known as the "Declaration of Interdependence for Agile Project Leadership" in order to offer what was hoped was a better way to manage projects. She believes that there is no such a thing as the perfect project. Some things will always go wrong that the products we deliver at the end of our projects will always be a compromise. The author ends the chapter with the optimistic note that managing projects is fun if approached with the right attitude.

In Chapter 29, Morten Fangel presents a case for how to advance project management professionalism and culture in a company. He offers twelve instruments that can be used for advancement initiatives. Included along with these instruments are recommendations such as the development of guidelines training strategies, modern methods such as coaching, and sparring between project management and organizational changes. Included in the descriptions are explanations of how to utilize the tool Scandinavian National Competence Baseline for self-assessment of project management competence level.

In Chapter 30, Sergey Bushuyev believes that an effective methodology of organization development management is one of the important application of the activation of the project approach. He believes that the implementation of a proactive organizational development program management model would allow organizations to advance to a high maturity level in the project management area, as well as help assure a stable development in the competitive environment.

In Chapter 31, Wayne F. Abba begins his chapter by mentioning how the military departments of the U.S. developed project management to deal with the cost, schedule, and technical performance of the highly sophisticated projects required to develop and produce military weapon and support systems. He then goes into a description of Earned Value Management, how the technique operates. The chapter closes with the reminder that Earned Value Management has become required for those organisations adopting the same management concepts used by Defense and NASA.

In Chapter 32, John Scanlin describes how Bell Atlantic in late 1994 started and developed its approach to project management. In the early days of project management at the company, most of what was being practiced was carried out through a project coordination approach. The team that developed Bell Atlantic's first corporate Project Management Office was the highlight in the careers for many of the professionals. The author concludes that it requires the entire enterprise to be on the same page to understand the value of project management in developing a successful project management process.

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EXAMPLES OF PROJECTS FOUND IN SPECIFIC COUNTRIES

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CHAPTER 1
SOFTWARE AND OTHER PROJECT MANAGEMENT PRACTICES IN INDIA

S. Srinivasan

Chinmay Jain

Bopaya Bidanda

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Chinmay Jain has about 3 years of experience in the software industry as a software engineer. He has been working with Qwest Software Services, the Indian subsidiary of Qwest Communications, Inc., for about 2 years. Previously, he worked with GlobalLogic India Pvt. Ltd., a company primarily involved with software product engineering. Chinmay has worked on Microsoft .Net and Java technologies during his career in the software industry. He holds a B.Tech degree in Industrial Engineering from Indian Institute of Technology, Kharagpur, India.

Dr. Bopaya Bidanda is currently the Ernest E. Roth Professor and Chairman of the Department of Industrial Engineering at the University of Pittsburgh. He also serves as Chair of the Council of Industrial Engineering Academic Department Heads (CIEADH) and on the board of trustees of the Institute of Industrial Engineers. His research focuses on manufacturing systems, global supply networks, reverse engineering, and project management in manufacturing/distribution systems. He has industrial experience in aerospace manufacturing and precision manufacturing. He has copublished two books with McGraw Hill in addition to more than 100 papers in international journals and conference proceedings. He has also given invited and keynote talks in multiple countries in Asia, South America, Africa, and Europe. During his career, he has completed numerous consulting and training engagements with a focus on facilitation of projects incorporating modern principles of industrial engineering and manufacturing into many different environments, ranging from regional small and medium-sized industries to national heavy engineering industries to precision luxury goods remanufacturing.

1.1 INTRODUCTION

Project management is an especially important concept for a developing country like India. Many projects small, medium, and large in size are often delayed, resulting in huge financial losses. As per the Standish Group report,[1] 23 percent of IT projects are canceled before completion, while 49 percent

[1] Project Management Associates, National Association of Project Managers Web site. [http://www.Pma-india.org]. Accessed Jan. 15, 2007.

are adversely affected by time overruns. As a result, the average cost overrun is equal to 63 percent of a project's original cost estimate.

We can conveniently divide projects into four categories in India for the purpose of our discussions:

- Mini projects in the corporate sector
- Small and medium-sized projects in the government and public sector
- Major projects in the Indian corporate sector and the public sector
- Software projects

The following sections will present details of project management practices in each of these categories.

1.2 MINI PROJECTS IN THE CORPORATE SECTOR

The results of a survey[2] of about 20 companies distributed by size and industry category indicated the following:

- Economic analysis played a minor role in project decisions.
- The large majority of projects focus on replacement or capacity addition.
- Project reviews are completed in two or three levels in an organization.
- In many cases, no tangible alternatives were available.
- Even if tangible alternatives were available, estimation of costs/revenues was difficult.

1.2.1 Investment Appraisal Practices in India

The survey found that in most cases, the payback period is used, and in large organizations the average rate of return is the major decision variable. However, a more recent survey[3] revealed that over the last few years, discounted cash flow techniques have gained importance and internal rate of return is increasingly being utilized. It also found that risk assessment and adjustment techniques are prevalent.

Small projects done presently in Indian corporate setups, such as six sigma projects and cost reduction projects, are being implemented utilizing project management tools. The authors have a decade of first-hand experience working through dissertation projects of graduate students. In general, the following trends have been noted by the authors:

- Projects are usually evaluated in financial terms using discounted cash flow analysis.
- A capital budgeting committee screens competing projects using the conventional and objective financial yard sticks.
- The requesting department typically oversees the project progress that is implemented by user departments including construction, maintenance, and so on. Good coordination exists between the project execution department and the user department.
- Good and continuous communication appears to exist during the implementation phase.

[2] Chandra, P. *Financial Management: Theory and Practice*. New Delhi: Tata McGraw-Hill Publishing Company Limited., 1984.

[3] Patel, B.M., and U.R.Cherukuri. " Net Value Added (NVA) and Share Value Appreciation Rate (SVAR): Improved Value Addition Measures for Evaluation of Capital Projects." [http://www.departments.bucknell.edu/management].

- There is widespread and liberal use of project planning and control tools such as critical path method and Program Evaluation Review Technique (PERT). However, these tools are not used to their full potential. Common sense–based scheduling and control is most often used. Network techniques are used mostly as showpiece. Nonetheless, the tracking and control technique is found to be very effective and the lack of use of such sophisticated tools does not typically constrain the flow of work since the number of work packages is small and precedence relationships are evident.
- Crashing activities and resource leveling exercises are typically not utilized though available resources are often used at optimal or near optimal rates.
- Rigorous utilization of network techniques and applications are often lacking in organizations. A lack of rigor however does not seriously affect pursuit of optimum utilization of resources.

Indian journals and archival literature provide valuable extensions on the state of the art in the field of project management. For example, a recent paper outlines the use of the goal programming technique in controlling multiple objectives of complex projects.[4] Using goal programming, the authors reduce the cost of the project. Such applications with breakthrough extensions are slowly beginning to appear in medium-sized projects that are planned by professional engineering companies.

However, at the implementation level, we find that sophisticated techniques are generally not used, even though projects are often completed as envisioned. Most practitioners are aware of discounted cash-flow analysis, risk evaluation, and even the most recent option, theory-based approaches. One possible explanation for this paradox (that is, the lack of technique utilization), is that in India, where a large segment of the economy is based on family controlled businesses, investment decisions are often made by senior family members based on conventional wisdom. Decision-makers use project management tools to justify the rejected proposals rather than select a sound proposal. This psychology is prevalent even today, as management does not want to act in deference to seniors and elders in the organization. As a result, an organizational culture gives respect to older manager who thinks in terms of standard accounting rate of return and prevails over the young professional manager who is educated in modern techniques in managing projects. Nonetheless, with globalization and other influences in the modern picture, new organizational practices are slowly being implemented, and we may see more and more application of recent techniques in the future.

1.3 SMALL AND MEDIUM-SIZED PROJECTS IN THE GOVERNMENT AND PUBLIC SECTORS

In contrast to projects undertaken at the corporate level that move at rapid speeds, small and medium-sized projects at the government department level are planned and implemented at a slow pace. Further, usage and awareness of project-oriented techniques are almost nonexistent. Technically, all projects are approved centrally by higher level administrative units. However, bureaucracy coupled with budgetary considerations often add serious project delays. The public tendering process involved in execution of work adds further delays in project execution and commissioning. There is much opportunity for improvement in the coordination between decision-makers and user departments. Governmental entities and engineers do not appear to be aware of project techniques and lack incentives to apply these techniques and the necessary authority to enforce those techniques. However, the authors have found that more and more government departments are slowly, but steadily, initiating the use of such techniques in the new economic climate.

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[4] Sharma, J.K., and B.B. Das. "Project Management through Goal Programming: A case study." Institute of Mathematical Statistics Journal group, Vol. 2, No. 1 (2006): 65–72.

1.4 MAJOR PROJECTS IN THE CORPORATE AND PUBLIC SECTORS

We discuss the general practices found in major projects in this section. Section 1.4.1 discusses the practices in Corporate sector and section 1.4.2 deals with public sector and government projects.

1.4.1 Major Projects in the Corporate Sector

Large corporations often use sophisticated applications of project management tools while undertaking major projects. For example, Reliance Industries, which installed the first private sector refinery in India, identified project management as one of its core competencies. Many private companies have shown the capabilities for timely completion of projects. A common model followed is that international consulting firms focus on the designing and planning level of a project and the field installation work is done by Indian workers. Many private firms including Larsen & Toubro and Reliance Industries have developed core competencies in project planning and execution at a world class level. The techniques adopted by these organizations are state of the art with an orientation toward practical applications.

1.4.2 Large Projects in the Public Sector and the Government

In developing countries like India, most public projects are initiated and operated by the government with its funds. Naturally, availability of funding is the biggest constraint. Even if funds are available initially, it is difficult to maintain continuous funding as the project progresses. The tradition here is that most big projects are delayed due to a limited availability of funds. The other major constraint to timely project completion is the acquisition of land that has political implications. Many Special Economic Zone (SEZ) projects allocated for attracting new industries require the acquisition of agricultural land as the first step. Although the government provides adequate monetary compensation, the displacement of unskilled agricultural labor allows political parties the opportunity to mobilize these workers to delay the project. Some political parties also believe that SEZs are, in reality, special *exploitation* zones. The lack of consensus among the various stakeholders and subsequent politicization of the issues have delayed many large projects in India.

For example, consider the case Tata Motors Limited, which undertook an ambitious initiative to introduce a "peoples car"—a small car for the Indian masses with a target price of 100,000 rupees (about $2,000 U.S.), which would make it the least expensive indigenously designed car in India. The Tata group is well known in India for its engineering talents, and this would be its corporate identification with Indian masses. The design and all aspects of the projects were ready for the first car to roll out by January 2008. The chief executive of Tata Motors specifically stated that "this is the crown jewel of the Tata family who do have an emotional connect and soft spot for people of West Bengal."[5] The government of West Bengal allocated lands near Kolkotta (previously Calcutta). However, the opposition parties politicized the land acquisition, causing a delay in the project and prompting the company to look at other out-of-state locations, if necessary.

As India moves from an agrarian-based economy to one that focuses on industry and technology, more agricultural lands will be repurposed. Until the government frames definitive policies instead of politicizing the issue, project delays will be inevitable. Public policy must balance long-term gains against short-term pains and there must be a strong public communication strategy to educate the public.

A major problem that can have a lasting effect on project planning and control techniques that may arise in coming decades is not the application of project planning and control techniques, but the socio-political process of initiating a project with land acquisition as a first step. The traditional

[5] "People's car in people's court: Tatas in hard sell, Mamata cries blood." *The Telegraph*. Calcutta, India. November 25, 2006.

dilemma of moving from agriculture toward industrialization is being faced by most developing countries that are democratic.

There is, however some progress being made and an acceptable code of conduct appears to be evolving—that multicrop lands should be maintained and only single crop lands should be used for such SEZs. Tax tariffs, project financing methods, participation of public and private efforts, general awareness of project management skills, and learning and improvement in project execution have tremendous potential for application in this arena. India and other developing countries could face a serious shortage of project managers and project staff with the broad engineering and management skills to work in multicultural environments.

Another case in point is the Narmada Dam project that involves the construction of a series of large hydroelectric dams on the Narmada River in India. The Sardhar Sarovar Project (SSP) is the largest multipurpose project of the Narmada Dam project. The expected benefits from this project have been estimated as[6]:

- Irrigation of 1,792,000 square kilometers spread over 12 districts and 3,393 villages in Gujarat state and 730 square kilometers in Rajastahan state
- Drinking water facilities to 8,215 villages and 135 urban centers in Gujarat
- Power generation of 1450 Megawatts
- Annual employment potential:
  - 700,000 man-years during construction
  - 600,000 man-years in post construction

Several other indirect beneficial effects have also been indicated, but these projects require an immediate displacement of many poor people who are unskilled workforce. This is an especially controversial project, and the challenge here is to apply an effective cost-benefit analysis within a project management framework. The measurement of cost and benefit will always remain a big problem. There is growing awareness now that the current generation is not as concerned (as they perhaps should be) with the cost or the environmental effects. However, with the strengthening of democracy at all levels and public education, it appears that sound decisions can be made.

Special Problems in Public Projects. In general, when we evaluate public projects, the conventional net present value method can be modified by transitioning into cost-benefit analyses. The typical problems in using cost-benefit analysis are as follows:

- **Quantification of benefits and attribution of monetary values.** In the case of industrial projects, incremental revenue after tax to the corporation can be easily estimated by the time series analysis or other forecasting models available.
- **Estimation of cost.** In big projects, cost estimation becomes more difficult since the time period is very long. This is exacerbated when a project site is located in a different country.
- **The philosophical problem of who will get the benefit at whose cost.** This has become a major problem in developing countries like India that have democratic governments. Large projects require large amounts of land to be acquired. Displaced agricultural workers find it difficult to adjust to new life, and the political environment adds fuel to their insecurity by inciting noncooperation.
- **The rate of discount to be used.** This is a controversial issue since some advocate zero rate, some use a low rate social discount rate, and some advocate a market rate from an opportunistic point of view.
- **Lack of finance.** Unlike private projects, government projects tend to be economically problematic from the beginning. Venture capital industry seems to be an answer to this problem.

[6] Wikipedia. "Narmada Dam Project." [http:// www.wikipedia.org]. Accessed Dec. 10, 2006.

1.5 INDIAN VENTURE CAPITAL INDUSTRY

Young private companies not yet ready to tap public financial markets may seek venture capital (VC). The birth of VC industries is a recent phenomenon in India. Ventures were the first VC institution jointly promoted with Units Trust of India (UTI) in 1988. Several banks followed this lead in forming their own VC subsidiaries. With the deregulation of foreign investments into Indian companies, international investors emerged as more significant players. Professor Prasanna Chandra notes that foreign investors brought with them a Western investment philosophy.[7] Rigorous due diligence, tight contracting, active post financing involvement, and a sharp focus on a timely and profitable exit are important aspects of their operation. Over the years, investor preferences appear to have drifted in favor of financing the expansion plans of firms already in operation, as opposed to green field ventures. The preference seems logical with international investors taking a calculated risk in well-established businesses rather than betting on unproven new ventures. Pandey[8] believes that Venture Capital Funds (VCFs) in India can be categorized into four groups:

1. VCFs promoted by central government controlled development financial institutions, where risk capital is funded by the Industrial Development Bank
2. VCFs promoted by state government controlled development financial institutions (such as the Karnataka State Finance Corporation or the Andhra Pradesh Venture Capital Limited)
3. VCFs promoted by public sector banks (such as Canfina by Canara Bank)
4. VCFs promoted by foreign banks and private sector companies (such as Grindlays India Development Fund)

The major objective of venture funds is to finance the research and development ideas of newly graduated Indian students, especially those from engineering institutes. The Indian government has established science and technology entrepreneurship parks with leading technical institutes, where students are encouraged to try new ideas. Seed money and technical advice are given to deserving new projects with an opportunity to set up incubators for trial production and commercialization. Several new products have been successfully developed in several of the Science and Technology Parks (STEPs) in India. Moreover, leading engineering schools have introduced courses to instill a sense of entrepreneurship in the minds of students.

New business competitions are also taking place in leading business schools with teams of students enthusiastically participating in these competitions. A recent trend indicates a willingness to compete in new business competitions that attract some bright talent to opt toward new startups (sometimes their own) instead of seeking highly paid jobs in large corporations. The percentage of these students is still small in comparison to developed countries and is limited to particular communities. As per Hindu scriptures, earning money is considered evil, and the focus of life is to realize God and free oneself from the cycle of birth-death/Karma. The utilization of knowledge to realize God, rather than to multiply wealth, has traditionally been the major impedance in instilling the spirit of entrepreneurship.

1.5.1 Capital Structure Practices in India

Generally speaking, capital structure decisions find major focus in finance literature. The two extreme views can be described as follows: Traditional theory indicates that there exists an optimal capital structure. This contrasts with the Modigliani–Miller theory that asserts that an optimal capital

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[7] Chandra, P. *Projects: Planning, Analysis, Financing, Implementation, and Review.* New Delhi: Tata McGraw-Hill Publishing Company Limited. 2002.

[8] Pandey, I.M. *Financial Management*. Vikas Publishing House Pvt. Limited, New Delhi, 2005.

structure does not exist. These are well-documented theories in finance literature. A survey regarding capital structures on Indian industries cited responses such as these:[2]

- **Electrical Industry.** "We try to maintain the debt–equity ratio as 2:1 because this is the government norm."
- **Chemicals.** "Ours is a conservative debt policy. We borrowed funds only in recent years for some expansion projects."
- **Tea.** "We have ample internally generated funds. We have never had to think about the debt."
- **Fertilizer**. "We don't have a specific debt–equity policy—it depends. A few years ago we relied on internal accruals. Now we are considering some term finance."
- **Aluminum.** "Our goal is to maintain a debt–equity ratio within a certain level, which of course is kept confidential."
- **Automobile.** "We do not have an internal debt–equity norm. Since the government permits a 2:1 ratio, we will remain within it. Of course, we will keep a cushion for bad times."

On the basis of different views expressed by different industry personnel, the following generalizations are made:

1. While some firms have been able to articulate their capital structure policy, others are yet to do so. The reasons why many firms have not been able to define their capital structure policy include
- widening of the instruments of financing
- lack of long experience with debt
- changing complexion of business risk

2. Firms that have articulated their capital structure policy seem to follow one of five polices:
- Policy A: No debt to be used
- Policy B: Debt to be employed to a very limited extent
- Policy C: Debt to equity ratio is maintained around 1:1
- Policy D: The ratio of debt to equity should be kept within 2:1
- Policy E: Debt should be tapped to the extent it is available

The empirical observations and comments are with reference to general corporate finance practices. Project financing, a recent development, has taken roots in infrastructure projects in power and telecommunications.

Infrastructure projects in developing countries usually have 20 to 30 percent equity and 70 to 80 percent debt. Generally, power projects have a higher ratio (approximately 70:30), while telecommunication projects have a low ratio (approximately 50:50). This reflects the internal cash generation in telecom projects when extending the main telephone lines. Since commercial banks and long-term international loans do not exceed 7 to 12 years, a number of infrastructure funds have been established for equity participation in infrastructure projects in developing countries. In India's case, these projects have become popular. In contrast to government funds, infrastructure funds provide a degree of accountability as equity holders demand some return. Also, some tax exemptions are attractive for stockholders and interest on debt is tax deductible.

In India, a maximum debt to equity ratio of 4:1 is permissible in infrastructural projects. To some extent, income from infrastructural projects is also tax-exempt. In the recent union budget of India, a five year "tax holiday" was allowed to any industry engaged in generation or distribution of power. Any enterprise that builds, maintains, and operates any infrastructure facility such as roads, highways, or expressways, or new bridges, airports, ports, rapid rail transport systems with varying degrees of ownership with an ultimate transfer to a public authority also qualifies for such tax exemption status. Also, section 36 (I) of the Income Tax Act has been amended to extend the benefit of deduction up to 40 percent of income credited. The period of the project is longer, and there is little experience in the kinds of activities that are required to be performed in big projects.

Unlike corporate/industrial projects that are financed by stockholders and bond holders and the beneficiary identity as well as the present consumption and risk-takers are known, government projects are funded by tax money contributed by wealthy individuals, and benefits of such projects reach the common man.

1.5.2 Project Financing

Project financing is most appropriate when a large amount of capital is required and high risks are involved and is only now beginning to be accepted and adapted to the Indian environment. It allows sponsors to finance larger projects than the company's credit and financial capability would permit and also to insulate the company's balance sheet from the impact of the project. The risk is distributed to several parties who are in the best position to control the risk factors. This reduces the moral hazard problem and minimizes the cost of bearing risk. Typically, a high degree of leverage is used in such project financing. The typical arrangements involve one of the following: Build-Own-Operate-Transfer, Build-Own-Operate, and Build-Lease-Transfer. Each model is now briefly described.

Build-Own-Operate-Transfer (BOOT) Arrangement. In this case, a private project company builds the project, operates for a sufficient period of time to earn an adequate return on investments, and then transfers the project to a host government or its agency. This facilitates private funding of the project, especially when the government faces inadequate funds.

There is a perception that usage rates established by private agencies are sometimes excessive. If an alternate older facility operated by the government is available, this creates arbitrage opportunities by overstraining the alternate older facility structure rather than promoting the use of new structure. For example, when Kolkata Port Trust built a new bridge over Howrah and charged a toll, the public continued to use the old bridges, the toll-free Rabindra Sethu and Howrah Bridge, defeating the purpose of relieving strain on the old bridge. Rabindra Sethu, commissioned in 1943, is a technological marvel, being built from 26,500 tones of steel. However, after being exposed to heavy traffic over the years, the life span of the old bridge will deteriorate unless some of the strain is taken off of the bridge. The possibilities of traffic arbitrage, even if small, works counter-productively in the ultimate goal of relieving the old structure. Charging for the use of old bridge will be resisted by the public since the charge will have to be more or less equal to the charge for using the new bridge in order for the plan to be effective.

It has been observed that most BOOT projects have guarantees by the government or the government agencies. Government guarantees for infrastructural projects have historical precedents in India—for example, setting up the railways during the British rule.

Build-Own-Operate (BOO) Structure. The BOO arrangement is an alternative arrangement to the BOOT model with an extremely lengthy transfer date. However, the transfer can be made by divesting fully or partly some holdings by foreign shareholders at the end of stipulated period. In a BOO arrangement, projects are funded without any direct sovereign guarantee, and also the sponsor preserves the ownership (though there may be contraction in ownership pattern).

Build-Lease-Transfer (BLT) Structure. In a BLT arrangement, control over the project is transferred from the project owners to a lessee. The ownership of the project is retained by shareholders, but operation purposes are leased. The host government buys the output from the lessee. The lesser receives a rental guaranteed by the local government with an arrangement approved by the financial corporations providing financing.

The state governments also grant tax holidays, and healthy competition exists between states to attract investments not only in infrastructure but also in promoting exports. Tariffs are set to recover the operating costs and to provide a rate of return to capital. Normally, in fully funded government projects, the tariffs are set at a low level and often the operating costs of projects are not recovered, let alone the recovery of invested capital. This creates a serious problem of inefficient operations of government projects as well as lack of investment in infrastructural projects.

To tide over these problems, project financing has used a model in which a separate project entity is created to share risk and manage the funds to get a reasonable return. Government and private participation, using responsible stockholders and allotment of projects through competitive bidding on the basis of final price for power, has been important in new development within an Indian project management framework.

Each of these models has strengths and weaknesses, though there is a sense of relief over the fact that rates are set at a remunerative level with accountability demanded for invested capital and operational efficiency in project organizations. Hopefully, all these developments will allow India to usher in a decade that will register a strong economic growth rate since economic expansion is now severely limited by infrastructural capabilities.

1.6 FUTURE PROBLEMS IN PUBLIC PROJECTS EXECUTION

Projects will continue to be implemented at back offices in less developed countries and coordination between back offices, project sites, and corporate headquarters will be a major problem area in the future. Front offices at projects require effective implementers who may face severe stress due to a project's harsh conditions as well as political problems. Project sites are increasingly exposed to dangerous environments including terrorist activities. India has placed many project staff in the Middle East, including Afghanistan and Iraq. It is believed that such system constraints, rather than technological resource constraints, will take precedence in future projects, especially in projects in developing countries like India. Effective project managers typically are cognizant of these risks and plan for mitigation measures.

1.7 ORGANIZATIONAL ASPECTS IN INDIAN PRACTICE

Traditional management literature discusses various forms of organizations, such as functional and matrix organizations. Most Indian organizations initiate a project management division reporting to a CEO and are held responsible for the progress of projects. Over a period of time, some progressive organizations have evolved into the matrix type of organizations where a project manager shares authority over functional managers. In large organizations involved in multiple projects, most often a matrix organization structure is followed. However, resolution of conflicts in such organizations is not often solved on the merit of the problem but by sheer organizational power blocs and special consideration is given to seniority. The operation of the matrix organization in an Indian context appears to be a weak matrix type where functional departments are seen to have significant influence over decisions.[9] This tendency is understandable since the matrix organization evolves from traditional functional organizations where senior personnel are typically in the seat of functional authority.

Modern practices including project-oriented team building, where individuals take on different roles in relation to the project goal and a leader in one project may take the role of a member in another project, are not prevalent in conventional organizations. However, in the case of software industries, such rotation of roles and exchange of authority has become accepted. In most of the traditional organizations, project team members and leaders are generally given the shift of roles as a way of removing from main line setup.

[9] Chodhury. *Project Management.* New Delhi: Tata McGraw-Hill Publishing Company Limited. 2002.

1.8 PROJECT MANAGEMENT PRACTICES AND ISSUES IN THE INDIAN SOFTWARE INDUSTRY

India has emerged as the most competitive and popular information technology (IT) outsourcing destination in recent years.[10] With an English-speaking workforce and a 24-hour workday culture, the industry continues to strengthen its position in the global sourcing arena. Besides, IT in India is no longer focused on low cost and high quality. It now focuses on technologically advanced issues such as information security, good and transparent corporate governance, and increasingly innovation. During the last decade, India accounted for 65 percent of the global industry in offshore IT.[11] The global offshoring market is growing rapidly, as the proven benefits of offshoring (also termed global sourcing or global delivery) induce more and more companies to adopt these practices, and as providers develop the capabilities to serve even more sophisticated customers.

The Nasscom-McKinsey Report 2005 estimates that only 10 percent of the addressable market for global offshoring has been realized so far, leaving ample room for future growth. India's leadership position in the global offshore IT industry is based on five main advantages: (1) a well-educated and large workforce: India now accounts for 28 percent of IT and BPO talent among 28 low-cost countries; (2) creation of an urban infrastructure that has fostered several IT clusters in the country; (3) operational excellence that has delivered cost and quality leadership in offshore service centers; (4) a conducive business environment including several favorable policy interventions such as telecom reforms; and (5) continued growth in the domestic IT sector that provides enabling infrastructure and develops a broad-based skill base.

Time-zone differences offer opportunities for a virtually 24-hour development process. When night falls in Asia, for instance, the results of today's work might transfer to a site in Europe where the workday has just begun. As the European workday ends, the documents go to America for further processing, before they return to Asia, arriving just in time for the new workday. However, implementing such distributed software development processes requires advanced infrastructure support. Companies interested in distributed development processes must address several technical and managerial issues.

One is the coordination challenge. In distributed teams, coordinating and sharing issues becomes more difficult, such as with the latest version of design documents (data availability), necessary interface changes between related modules (change control and configuration management), or questions to the teams' expert on a certain topic (knowledge transfer). Additionally, the countries usually have different off-days and religious or national holidays. India celebrates its Independence Day on 15th of August, for instance, while the United States celebrates on 4th of July. Consequently, when developing in another country, a company must consider possible temporal dispersion when setting delivery deadlines or meeting appointments. Ignoring such cultural specialties could produce resentment and damage morale.

Software exports account for approximately 80 percent of the total software services and revenue. The United States has been a key market for Indian software exports, accounting for over two-thirds of its total software exports. Typically, a U.S. firm begins by outsourcing a fairly small project to an Indian vendor, with the objective of evaluating the vendor's capabilities. Not only are the initial outsourced projects small, but much of the work boils down to the Indian firm supplying software programmers to work onsite. The shift to offshore work requires substantial investment in physical infrastructure (including secure physical and computing infrastructure that some clients demand to protect their intellectual property). Just as important, it also requires that the Indian firm be able to demonstrate project management capabilities.

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[10] Ziff Davis Media. *CIO Insight: Global Outsourcing Report 2005* [http://www.cioinsight.com].

[11] The NASSCOM-McKinsey study. "Extending India's Leadership of the Global IT and BPO Industries." Nasscom Research Report. 2005.

1.8.1 A typology of Software Exports

Software exports can be divided into three categories based on where software is developed and how the development is managed and organized. The first category is onsite consulting or onsite projects, where the Indian company provides the U.S. client with software professionals possessing the particular technical skills required by the client. In essence, the entire project is executed at the client's site. The client manages the project, controlling the deliverables and deadlines. The software is developed according to the client's processes, and a more accurate description would be to label this supply of staff augmentation services to overseas clients.

The second category of exports has a mix of work done offshore (in India) as well as on site. In this model, the Indian company sends a few software professionals to the client's site for requirement analysis or training in a particular system. These professionals then bring back to India the specifications for the software and a larger team develops the software offshore. If the project is large, a couple of Indian professionals remain at the customer's site acting as liaison between the project leaders offshore and the clients. Sometimes these onsite professionals are needed for emergency operations and for reassuring the client that the project is proceeding according to schedule. To execute such projects, a firm needs not only skilled professionals, but also a software development process and methodology, and an ability to manage software development. Unlike onsite projects, the Indian firm provides technical and managerial expertise for offshore projects.

The third method of software export, similar in some respects to offshore development, is in the form of an offshore development center. An offshore development center is a popular organization form, especially for firms based in the United States and Europe and who wish to take advantage of the skilled talent pool and lower wages in India. An offshore development center involves an umbrella contract with a long-term agreement on prices for time and materials (usually standardized on a man-hour basis). Periodically, the client sends projects to the center. For each project, the negotiations are largely restricted to the resources and time that will be required. In some cases, the place where the work is done is physically separate from the rest of the Indian company and secured. Firms that have been outsourcing software to Indian companies for a long period prefer this form of organization since they are confident of the Indian company's capabilities and rely on their processes for delivering software.

Many projects are cost-plus ("time and materials" is the term used in the industry), and so clients must trust the supplier not to overcharge them. Fixed-fee contracts involve greater risk taking by the vendor in contrast to cost-plus contracts. With greater risk also comes greater control over the organization and management of work.

1.8.2 Phases in Software Project Life Cycle

Software project life cycle requires more emphasis on the front end to ensure design of the product to meet the customer's needs. This front end work involves representatives from several different areas to ensure communication and coordination of the software requirements.

Requirement Gathering. Requirement gathering is the first and most important phase of the software development life cycle. During this phase, the marketing and sales people (or the project manager) remain in constant contact with the customer to determine requirements of the project in detail. Main tasks in this phase include requirements determination, risk analysis, schedule setup, and deliverable decisions. Communication with the customer is carried out using any of the following means of communication, such as Instant Messenger, e-mail, phone, voice chat, or a personal meeting. A software requirements specification document (SRS), which is a complete description of the services of the system to be developed, is prepared at the end of this phase. The SRS document includes a set of functional requirements that describe all of the interactions that the users will have with the software. In addition to functional requirements, the SRS also contains nonfunctional (or supplementary) requirements such as performance requirements, quality standards, or design constraints that impose constraints on the design or implementation.

Offshore development may also lead to many problems such as physical distance, cultural differences, trust, communication, and so on. If the client's requirements are not gathered and defined accurately, the rest of the project becomes meaningless, since it does not reflect the client's needs. The quality and capacity to analyze and manage the requirements of software projects not only affect the final product quality, but also the time required to satisfy the objectives and meet the client's expectations. A 2004 research report from Meta Group (since acquired by Gartner) indicates that 60 to 80 percent of software development outsourcing failures in global 2000 companies was due to poor requirements gathering, analysis, and planning.[12]

Requirements may be documented in various forms, such as natural-language documents, use cases, user stories, or process specifications. Requirements analysis can be a long and arduous process. New systems change the environment and relationships between people, so it is important to identify all the stakeholders, take into account all their needs, and ensure they understand the implications of the new systems.

Issues with Requirements. Some of the most prominent issues are listed here and represent a majority of the challenges in software development.

- Clients do not understand what they want.
- Clients will not commit to a set of written requirements.
- Clients insist on new requirements after the cost and schedule have been fixed.
- Clients often do not participate in reviews.
- Clients do not understand the development process and technical issues.
- Developers and clients may have different sets of vocabularies.
- Developers may try to fit the requirements to an existing system, rather than developing a system specific to the needs of the client.
- Analysis is often carried out by developers, rather than people who have the domain knowledge to understand the requirements of the client.

The real trouble starts with the first deliveries of working software, which is months, and sometimes years, down the road. Software development projects get into serious trouble at this late stage, since many of the gaps in requirements weren't identified and flagged for correction at the requirements gathering phase.

Agile Software Development. Many companies are adopting agile methodologies for software development in India as the requirements keep changing. In all agile methods, the highest priority is to satisfy the customer through early and continuous delivery of valuable software. Following are 12 principles of agile software development:

1. The highest priority is to satisfy the customer through early and continuous delivery of valuable software.
2. Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter time scale.
4. Business people and developers must work together daily throughout the project.
5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.

[12] Meta Group. "Increasing Business/IT Relevance and Adaptability: Adopting Requirements Visualization." White Paper. Accessed October 2004. [http://spectrum-systems.com/white_papers/wp_meta_group.pdf].

6. The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
7. Working software is the primary measure of progress.
8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
9. Continuous attention to technical excellence and good design enhances agility.
10. Simplicity—the art of minimizing the amount of work done and avoiding unnecessary work.
11. The best architectures, requirements, and designs emerge from self-organizing teams.
12. At regular intervals, the team reflects on how to become more effective, and then tunes and adjusts its behavior accordingly.

1.8.3 Estimation

Four basic steps are involved in software project estimation:

1. Estimate the size of the development product. This generally requires the use of lines of code (LOC) or function points (FPs), but other units of measure are possible.
2. Estimate the effort in person-months or person-hours.
3. Estimate the schedule in calendar months.
4. Estimate the project cost in dollars.

Estimating Size. Size can be estimated by comparison. Having done a similar project in the past and knowing its size, one can estimate each major piece of the new project as a percentage of the size of a similar piece of the previous project. Then, one can estimate the total size of the new project by adding up the estimated sizes of each of the pieces. An experienced estimator can produce reasonably good size estimates by comparison if accurate size values are available for the previous project and if the new project is sufficiently similar to the previous one.

Size can also be estimated by counting product features and using an algorithmic approach such as FPs to convert the count into an estimate of size. Macro-level "product features" may include the number of subsystems, classes, modules, and methods/functions. More detailed "product features" may include the number of screens, dialogs, files, database tables, reports, messages, and so on.

Function point analysis (FPA) is a standard method of measuring the size of a software development or software enhancement project for business application. FPA describes a unit of work product suitable for measuring size of a business application.

Estimating Effort. Effort can be derived from size in two ways. The best way is to use the organization's own historical data to determine how much effort previous projects of the estimated size have taken. This, of course, assumes (a) the organization has been documenting actual results from previous projects, (b) the organization has completed at least one past project of similar size (it is even better if several projects of similar size can be compared as this reinforces that a certain level of consistent effort is needed to develop projects of a given size), and (c) that a similar development life cycle and methodology will be followed, similar tools will be used, and use a team with similar skills and experience for the new project.

If little historical data is available in the organization or if the project is different in one or more key aspects, a mature and generally accepted algorithmic approach such as Barry Boehm's COCOMO model or the Putnam Methodology can be used to convert a size estimate into an effort estimate. These models have been derived by studying a significant number of completed projects from various organizations to see how their project sizes mapped into total project effort. These "industry data" models may not be as accurate as historical data, but they can provide useful ballpark effort estimates.

Estimating Schedule. Another step in estimating a software development project is to determine the project schedule from the effort estimate. This generally involves estimating the number of people who will work on the project, what they will work on (the Work Breakdown Structure), when they will start working on the project, and when they will finish (this is the "staffing profile"). Once this information is available, it must be integrated in to a calendar schedule. Again, historical data from an organization's past projects or industry data models can be used to predict the number of people needed for a project of a given size and how work can be broken down into a schedule. If little else is available, a schedule estimation rule of thumb can be used to get a rough idea of the total calendar time required:[13]

$$\text{Schedule in months} = 3.0 \times (\text{effort-months})\ 1/3$$

Opinions vary as to whether 2.0, 2.5, or even 4.0 should be used in place of the 3.0 value—identifying the most appropriate constant is an iterative process.

Estimating Cost. Many factors must be considered when estimating the total cost of a project. These include labor, hardware and software purchases or rentals, travel for meeting or testing purposes, telecommunications (such as long distance phone calls, video-conferences, dedicated lines for testing), training courses, office space, and so on. Exactly how one estimates total project cost depends on how the organization allocates costs. Some costs may not be allocated to individual projects and may be recovered by adding an overhead value to labor rates (dollars per hour). Often, a software development project manager will estimate only the labor cost and identify any additional project costs not considered "overhead" by the organization.

The simplest labor cost can be obtained by multiplying the project's effort estimate (in hours) by a general labor rate (dollars per hour). A more accurate labor cost would result from using a specific labor rate for each staff position (for example, Technical, QA, Project Management, Documentation, Support, and so on). You would have to determine what percentage of total project effort should be allocated to each position. Again, historical data or industry data models can help.

The Issues with Estimates. Several issues can make estimates difficult.

Estimating size is the most difficult (but not impossible) step intellectually and is often skipped in favor of going directly to estimating a schedule. However, if you haven't thought through what you are being asked to build, you really don't have a good base from which to predict a schedule or to evaluate how scope changes may affect the schedule.

Customers and software developers often don't really recognize that software development is a process of gradual refinement and that estimates made early in a project lifecycle are "fuzzy." Even good estimates are only guesses, with inherent assumptions, risks, and uncertainty—yet they are often treated as though they are cast in stone. What can help is offering estimates as a range of possible outcomes by saying, for example, that the project will take five to seven months instead of stating it will be complete on June 15. Beware of committing to a range that is too narrow, as that's tantamount to committing to a definite date. Alternatively, you could include uncertainty as an accompanying probability value by saying, for example, that there is an 80 percent probability that the project will complete on or before June 15.

Organizations often don't collect and analyze historical data on their performance on development projects. Since the use of historical data is the best way to generate estimates for new work, it is very important to establish some fundamental project metrics that you collect for every project.

Estimating Maintenance and Enhancement Projects vs. New Developments. The software industry does far more maintenance and enhancement work on existing products than on completely new developments. Most maintenance projects are a combination of new development and adaptation of

[13] McConnell, Steve. *Rapid Development: Taming Wild Software Schedules*, 1st ed. Redmond, WA: Microsoft Press. 1996.

existing software. Although the estimation steps outlined so far can still apply to maintenance and enhancement projects, some special issues have to be considered.

When sizing new development for a maintenance project, one must keep in mind that inserting this new functionality will be feasible only if the product's existing architecture can accommodate it. If it cannot, the maintenance effort must be increased to rework the architecture.

It's tricky to attempt to size adaptation work in the same manner as new work. An experienced individual estimating maintenance effort by comparison is a more common approach than attempting to size adaptation work in LOC or function points and then converting size to effort.

Estimation models that are calibrated to produce effort and schedule estimates for new development projects assume everything is created from scratch. This isn't the case for maintenance projects in which you are modifying a certain amount of existing documentation, code, test cases, and so on. Using these models may tend to overestimate maintenance projects.

Often, maintenance work has fixed delivery dates (e.g., a maintenance release every six months or once a year) and is done by a fixed number of people (i.e., an allocated maintenance team), so estimates have to deal with fitting work into a fixed timeframe with a constant staffing level. Some existing estimation models do attempt to address maintenance concerns. At the moment, a lot more support, guidance, and discussion are available regarding new development estimation than is available on maintenance and enhancement estimation.

1.8.4 Software Design

Most of the strategic decisions about the system are made in the development of the system concept during the analysis phase. The steps in the design phase determine exactly how the system will operate. The design phase consists of the following steps:

1. The development of the basic architecture design for the system that describes the hardware, software, and network infrastructure that will be used. The interface design specifies how the users will move through the system and the forms and reports that the system will use.
2. The database and file specifications are developed. These define exactly what data will be stored and where they will be stored.
3. The analyst team develops the program design, which defines the programs that need to be written and exactly what each program will do. This design is handed to the programming team for implementation.

1.8.5 Project Planning and Scheduling

Selection and use of the right tools for managing the project are critical to successful tracking of progress. Allocation and managing resources are also critical aspects to keeping the project on schedule.

Gantt Charts. Gantt charts are useful tools for planning and scheduling projects. They facilitate assessment of project length, determine the resources needed, and lay out the order in which tasks need to be carried out. They are useful in managing the dependencies between tasks.

When a project is under way, Gantt charts are useful for monitoring its progress. One can immediately see what should have been achieved at a point in time and can take remedial action to bring the project back on course if necessary. This can be essential for the successful and profitable implementation of the project. Depending on the software used, one can also see activity sequences, activity start and end dates, resource assignments, activity dependencies, and the critical path.

Resource Assignment and Leveling. Resource leveling is used when resources are limited or time constrained and when specific schedule dates need to be met. Resource leveling attempts to smooth out the resource assignments to get tasks completed without overloading any individual while trying to keep the project on schedule. This typically takes the form of allocating resources to critical tasks first.

The project manager can accomplish resource leveling in several ways. He or she might delay the start of a task to match the availability of a key member or adjust the resource assignments so that more tasks are given to team members who are under-allocated. The PM can also split some tasks so that the team member with the pertinent knowledge performs the critical part of the task and the noncritical part of the task is given to a less-skilled team member.

1.8.6 Testing

Software testing is any activity aimed at evaluating an attribute or capability of a program or system and determining that it meets its required results.

White-Box and Black-Box Testing. White-box and black-box testing are terms used to describe the point of view a test engineer takes when designing test cases. Black-box test design is usually described as focusing on testing functional requirements. White-box test design allows one to peek inside the "box," and it focuses specifically on using internal knowledge of the software to guide the selection of test data.

In recent years, the term "gray-box testing" has come into common usage. Gray-box testing is a software testing technique that uses a combination of black-box testing and white-box testing. Gray-box testing is not black-box testing, because the tester does know some of the internal workings of the software under test. In gray-box testing, the tester applies a limited number of test cases to the internal workings of the software under test. In the remaining part of the gray-box testing, a tester takes a black-box approach in applying inputs to the software under test and observing the outputs. The typical gray-box tester is permitted to set up the testing environment and can view the state of the product after his or her actions, such as performing a database query on the database to find the values of certain attributes.

Issues with Testing. Lack of planning is arguably the number one problem leading to insufficient testing. At the beginning of the project, a lot more thought is normally invested in estimating the effort for design and code than into planning a detailed test strategy. This problem gets compounded when design changes are made at some later point in the project. It is quite common that corresponding changes in test efforts are not considered.

Frequently, project teams start to think about testing when they get close to code completion. That is clearly too late. Early involvement of test staff or quality assurance (QA) is critical to include design considerations for testability. It is also crucial to get QA input for project planning and scheduling. Finally, QA staff can do many things in parallel with design and implementation activities. This can save considerable time at the end of the project.

A more insidious problem is created by schedule overruns. Most projects work against a fixed deadline for delivery. The deadline may be imposed by a customer, a trade show, or similar issue. It is typically difficult to move an end date, and in some cases, severe financial penalties or opportunity costs are associated with a slip. When design and development activities overrun (and they almost always do), testing gets squeezed between the development end date and the immovable delivery date.

Related to this phenomenon is the widely held view that the job is done once coding is complete. Some believe that testing is done simply to catch problems introduced by incompetent programmers. And since most companies are proud of their programmers, the feeling is that testing is more of a luxury or safety net rather than an integral part of the software development process, which it is.

The testing phase is often (rightly or wrongly) much shorter than that of design and development. Accordingly, test resources tend to be required during certain peak periods and there may be little or no need for testing staff at other times. Small and mid-size companies especially find it difficult to keep a staff of dedicated test experts. It is more convenient to use development staff for testing. Developers are shifted from coding to testing, which makes perfect sense from a staff-balancing perspective. It is, however, a frequent source of quality problems.

First of all, developers see testing as a lowly job compared to design and development. They are not very motivated and try to get the job done as quickly as possible (and therefore are unlikely to argue that the testing period is too short). Second, it is ineffective to ask somebody who coded a piece of software to then try to find errors in it. Many companies try to avoid the problem by allocating people to test code they did not write. But these developers are still part of the development team that, as a group, created this application. Even with the best of intentions, they tend to test along the same thinking path that introduced a defect in the first place.

Lastly, while development occupies a good part of the computer science curricula at universities, testing is hardly ever mentioned. Most companies send developers to a variety of training courses, but testing courses are much less popular for some of the reasons mentioned above. There is also a considerable shortage of good test training.

1.8.7 CMM Certification

CMM is the classic Capability Maturity Model from the Software Engineering Institute at Carnegie Mellon University. The CMM defines five levels of software process maturity based on an organization's support for certain key process areas.

A level 1 (initial) process describes an organization with an immature or undefined process. Level 2 (repeatable), level 3 (defined), level 4 (managed), and level 5 (optimizing) maturities describe organizations with higher levels of software process maturity. For most Indian software companies, attaining SEI-CMM Level 5 has been considered the pinnacle in their journey to attain the peak of quality. Seventy-five percent of the world's CMM level 5 software development organizations are based in India. The reason why India has such a high percentage of the world's CMM companies is because it was a great confidence-inspiring badge for the Indian outsourcers to show off to their clients. More than using SEI CMM as processes for quality and productivity improvement, a focus on quality and certification is still being used as a marketing instrument. The drive for attaining a particular certification or CMM level has led to a predominantly compliance-based approach instead of really driving business excellence and innovation through quality and processes.

1.8.8 Defect Prevention

Defect prevention is one of the most important activities of a software development life cycle, which has a direct impact on controlling the cost of the project and the quality of the deliverables.

Root cause analysis is the process of finding and eliminating the cause, which would prevent the problem from recurring. Finding the causes and eliminating them are equally important. A Pareto chart is prepared to show the defect category with the highest frequency of occurrence—the target.

1.8.9 Employment Issues

As the Indian software industry is growing at a rapid pace, companies are vying to retain the best talent. The competition for talent has also given rise to a disturbingly high employee turnover, leading to a high cost of hiring and employee development. For knowledge-intensive activities, such as high-tech product development, attrition means not only losing people to competitors but also knowledge walking out of the organization. Clearly, talent acquisition and retention is fast becoming the centerpiece of companies' competitive strategy. Many firms are recruiting based on a person's ability to learn. Large companies have established their own training hubs and learning centers.

To combat the retention issue, they use many strategies, including providing continuous learning opportunities and increasing employability, high quality of work and work life, overseas assignments, competitive compensation and pay for performance, perks, loans, recreation facilities, wealth creation opportunities such as employee stock options, support for distance learning, and career progression and management.

The key to solving the retention issue, however, is capitalizing on the existing emotional reservoir in each organization and effectively managing employee expectations. With the Indian software professional's median age being only 26.5 years, managing the industry's raw material—the people—is indeed a complex undertaking. Younger employees have different expectations and priorities from their older counterparts and are often unsure as to their goals. To stay competitive, many companies have established human-resources differentiators who go beyond the work environment and look at employees' personal, social, and family needs.

Today, even India's burgeoning population, with 50 percent of its people in the average age of 25 years and below, is emerging as a major asset for the nation. It is being said that with such a large group of people in the working age group category, India is unlikely to face any manpower crunch in the future. This is of course the rosy side of the picture. The facts, however, show that this large body of people is not directly employable and needs to be transformed into "suitable" offshore talent before it can be used by the country's technology industries.

1.9 PROJECT MANAGEMENT EDUCATION IN INDIA

Most Indian universities (including the Indian Institutes of Technology) offer Project Management as an elective course. Topics typically include critical path method, program evaluation review (PERT), and project evaluation techniques such as net present value, internal rate of return method (IRR), and cost-benefit analysis. Some courses include cost of capital, organizations for project management, and others. Some universities have started offering more elective courses such as advanced project management. the advanced course focuses on network techniques as applied to projects. The Project Management Association in New Delhi offers a part-time postgraduate program in project management. Now, more and more educational institutes have already started, or are due to start, postgraduate programs in project management such as construction management/infrastructural management.

Engineering education in India appears to be poised for a great change. The focus on narrow intra-disciplinary knowledge has all but evaporated. In the changed global economy, the market requires that undergraduates acquire a general set of engineering and quantitative skills with the ability to understand the basics of civil, mechanical, and electrical engineering, and in general any engineering basics that we can denote as hard skills. In addition to that, students are in need of soft skills such as communication skills and understanding and working in a multicultural social environment.

The authors suggest that undergraduate engineering should focus on general engineering and project engineering so that students are trained to meet the market expectations. Narrow specialization in engineering such as thermodynamics and electrical machines can be covered at the postgraduate level after the student has decided to opt for a particular track in his or her career.

It is our opinion that in the future, undergraduate engineering curricula may have a strong component of project engineering and management as compulsory subjects. The trend is quite clear. A general multiengineering tool base with project management skills and soft skills such as communication skills, leadership, and team working skills may be the need of the hour in today's world. Some progressive universities across the globe are striving for this already.

1.10 CONCLUSION

India has come a long way toward prominence as a software superpower, but it must address certain issues to continue to enjoy its current reputation. Innovative thinking and practices to retain knowledgeable workers will be critical to the industry's success in the long run. Also, a catalyst for the industry's growth clearly has been low costs; this advantage must be sustained through continued productivity and infrastructure improvement.

The rising cost of salaries, the cost of attrition, and the lack of a world-class infrastructure seem to be weakening the cost advantage. Other important issues requiring immediate attention include brand-building, significantly improving the quality of training, securing global parity in telecom infrastructure, and creating an ideal regulatory framework. More focus on product development to move up the value chain and ensure higher revenue generation requires a serious and immediate effort.

1.11 ACKNOWLEDGMENTS

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CHAPTER 2
THE SYDNEY 2000 OLYMPIC GAMES

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Brian has held positions as a founding director, national president of the Australian Institute of Project Management (AIPM); he has also chaired a number of committees for PMI (U.S.A.). He was the recipient of the 2003 Australian council of PMI Chapters Distinguished Contribution award is currently an Adjunct Professor to the School of Business (Curtin University-Western Australia), an Adjunct Professor of project management (University of Technology-Sydney, Australia) and an Honorary Associate of the Graduate School of Government (University of Sydney).

Jonathan Shahady graduated as a civil engineer in 1986 and has worked in the engineering, building, and project management fields predominantly within the Australian construction industry. Jonathan is a director of the Tracey, Brunstrom & Hammond Group and has gained extensive experience in the planning and management of all phases of construction projects, as well as a range of other corporate, technology and telecommunications projects. He has worked and advised on major projects for the Sydney 2000 Olympics, Athens 2004 Olympics, Melbourne 2006 Commonwealth Games, Doha 2006 Asian Games, and the 2008 Beijing Olympics. He gained experience both in the resolution of contractual disputes and as an expert witness in construction disputes.

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2.1 PREAMBLE

Prior to the year 2000, the Summer Olympic Games had been held only once in Australia, in Melbourne in 1956. Australia was very keen to seek a second Olympic Games, and in the early 1990s, a well planned and committed effort was underway to host the 2000 Olympic Games in

Sydney. The bid was successful, and when this success was announced in 1993, Sydney had seven years to prepare and then hold what was desired to be the best summer Olympics ever.

The approach toward preparing and running the 2000 Olympics was very much a management by project process. The timeline and phases for staging the games are summarized as follows:

Initial Phase

- Concept/idea incubation: Early 1970s to 1988
- Feasibility: 1988 to 1990
- The bid: 1991 to 1993
- Establish Organization(s) and Project Charter—confirm policies: 1993 to 1995

Intermediate Phase

- Strategic planning—confirm programs and project briefs: 1993 to 1995
- Conceptual planning—master planning and budget reviews: 1995 to 1997
- Operational planning—functional to venues: 1997 to 1998
- Design and Procurement—review plans: 1998 to 1999
- Testing and Contingency planning: Refine operating plans: 1999 to 2000

Final Phase

- Games time: 2000
- Retrofit and reinstatement: 2000 to 2001
- Legacy: 2001 and beyond

Two significant milestones in the process of preparing for the games occurred during the first six years of preparation. The first was in 1995—some two years after winning the bid—when very specific areas of responsibility for the delivery of clearly identified project components were established. The New South Wales state government appointed one of its senior cabinet ministers as "The Minister Responsible for the Sydney Olympics." Sydney Organising Committee for the Olympic Games (SOCOG) had been previously established at the outset of winning the bid and was the primary organization responsible for fulfilling the host city's obligations and running a successful Olympics. However, in 1995, the government created the Olympic Co-Ordination Authority (OCA), responsible for the delivery of the capital works and infrastructure for the games. Also created was the Olympic Roads and Transport Authority (ORTA), responsible for organizing and coordinating all public and private transport for the games.

These three organizations reported directly to the Minister for the Olympics. Supporting and working across the matrix of these three organizations were two additional specially created organizations, the Olympics Security Command Centre (OSCC), responsible for Olympic Games security, and the Sydney Olympics Broadcasting Organisation (SOBO), responsible for the successful broadcasting of the games to a global audience.

These organizations all had clear component project areas, each well scoped, that were required to deliver the overall project of the 2000 Olympic Games. This organizational restructure so early in the delivery timing was a significant contributing factor to the delivery of a successful Olympic Games, but how these project components would be finally integrated when being managed by separate organizations was unclear. However, by 1999, all of the major sporting facilities and infrastructure had been successfully finished in an extremely timely manner, and as had been initially planned. Thus the facilities were available and in fact were being used for sporting events for a period of 12 months prior to the actual date for the start of the games in September 2000.

This early completion of facilities and infrastructure in fact provided a 12-month testing and commissioning period for the holding of the games and provided the opportunity for the second major milestone in the successful delivery of the games, an adequate testing and commissioning period and the organizational integration of the OCA and SOCOG. It was at this stage that as OCA had completed its obligations, the state government merged the OCA and SOCOG. This brought all the project experience of the construction of the facilities and infrastructure to the operational organization. As a result, during the final 12 months leading up to the games, the various project components that had been established as deliverables in 1995 were successfully integrated. This was, in hindsight, an aspect that was a major contributing factor for a successful project.

2.2 HISTORY OF SYDNEY'S SUCCESSFUL BID FOR THE 2000 SUMMER OLYMPICS

On February 1, 1993, Sydney submitted its bid for hosting the 2000 Olympic Games to the International Olympic Committee (IOC). Production of Sydney's official candidature file commenced two years earlier when the New South Wales (NSW) state government created the Sydney Olympic Bid Limited (SOBL) company to promote and prepare Sydney's bid for the 2000 Olympic Games. However, the possibility that an old industrial site in the center of metropolitan Sydney, called Homebush Bay, could be rehabilitated as a future Olympic site was first raised 20 years prior in the early 1970s.

Thereafter, the concept of Homebush Bay and Sydney hosting an Olympic Games was placed on the drawing board. Minor steps were taken toward a bid throughout the 1980s with some parts of Homebush Bay being developed in anticipation, including the State Sports Centre completed in 1984, and later Bicentennial Park developed as part of Australia's Bicentenary celebrations in 1988.

But it wasn't until the Australian Olympic Committee (AOC) met with the NSW government in April 1989 that support for a Sydney bid gained momentum. The NSW government commissioned separate committees to review firstly that Homebush Bay would be suitable as an Olympic Games site and that a Sydney bid could be successful.

In November 1990, the AOC decided that an Australian city should bid to host the Olympic Games in 2000. The AOC would endorse the candidature of the city of Sydney for the right to organize and conduct the 2000 Olympic Games, subject to several conditions, including the following:

- That the proposal proved to be satisfactory
- That agreement could be reached on the proposed organization for the candidacy and the games
- That during the period of the candidacy the NSW government would commence and substantially complete the construction of the proposed International Aquatic Centre and State Athletic Centre at Homebush Bay

In February 1991, the Federal Government approved a grant to assist the NSW government with the funding of Stage 1 of the construction of the sporting facilities at Homebush Bay. In March 1991, the contract endorsing Sydney as a candidate to host the 2000 Olympic Games was signed by the AOC, the City of Sydney, and the state of New South Wales. By May 1991 the NSW government appointed a bid committee and created the Sydney Olympics 2000 Bid Limited (SOBL) and appointed its chief executive officer. At that time, SOBL was made up of 42 staff, which had been selected from government, corporate, and sporting organizations.

2.2.1 The Announcement of Sydney's Successful Bid for the Games

In the early morning of September 24, 1993, at approximately 5:00 A.M. at the Sydney Opera House, huge excitement erupted and an ecstatic crowd began a party that was to last until October 2000—some seven years prior to the actual event. The catalyst for this excitement was an announcement made half a world away in Monaco. Juan Antonio Samaranch, then president of the IOC, made the announcement: “And the winner is . . . Sydney!”

2.3 OBJECTIVES AND COMMITMENT OF THE SYDNEY 2000 GAMES

After Sydney’s selection as the host city for the 2000 Olympic Games was announced, the AOC, the Council of the City of Sydney, and the IOC signed the Host City Contract. The contract specifies the rights and obligations of all parties. The requirements outlined in the Host City Contract can generally be categorized in two parts:

- The objectives, guidelines and obligations of a host city in conducting the games, such as minimum accommodation standards for the athletes, media, and the Olympic family (i.e., the IOC/National Olympic Committees (NOC)/International Sporting Federations (ISF); protocols for intergovernmental relations; medical regulations regarding activities, such as controlling dope; revenue sharing and host broadcasting requirements.
- Achieving key milestones toward preparing for the games—such as financial payments; assisting with IOC inspections and progress reports; selection of mascots and branding announcements; arranging various official visits; selection of the host broadcaster; and marketing and sponsorship licensing.

While Sydney’s bid included its commitment to the ideals and requirements of the IOC Host City Contract, the commitment made by Sydney in its bid to win the 2000 Olympic Games was also to provide an event that included the following:

- New facilities and accommodation that surpassed the needs of the athletes
- Long-term legacy
- Private sector involvement
- Respect for the principles of Ecologically Sustainable Development (ESD)

The Sydney bid was dubbed both “The Athletes’ Games” and “The Green Games.” Remembering that the main site at Homebush Bay was an old industrial site that was significantly polluted, the title “The Green Games” also meant a strong commitment to remediation of the site, under the watchful eyes of Greenpeace, the community, and environmental specialists and experts—a critical audience with very high expectations.

Further, Sydney’s Olympic Games organizers were also committed to the requirements of the Endorsement Contract signed between the Australian Olympic Committee, the City of Sydney, and the NSW government, which had endorsed Sydney’s bid for the games. Sydney’s official candidature file together with the Host City Contract would become the project charter and the terms of reference for delivering a successful games.

2.4 THE EARLY DAYS OF ORGANIZING THE GAMES

Sydney was tasked with the challenge of turning a bid from vision to reality. When the city won the right to hold the games, some environmental remediation work was already under way at the site, an International Sports Centre was functioning on the site, and an athletics “warm-up” field and an aquatic center were already being built. However, a lot more was required in the way of infrastructure and facilities on the Homebush Bay site as well as other locations around Sydney.

Although everyone was anticipating Sydney to win the bid, when it actually won, many parties were vying to be part of the process, both for commercial and prestigious reasons. The first thing that had to be done was to restructure the government organizations that were to be involved in the delivery of the games in the seven years leading up to the games. Remembering that the bid committee and SOBL would no longer exist once the games had been won, organizers could consider that phase of the project successfully completed.

The NSW government's first priority, in late 1993, was to establish the main Olympic organization and statutory authority, SOCOG. The NSW government also established working committees on health, transport, and security to work with SOCOG.

The NSW government's other Olympic responsibilities for the coordination and delivery of facilities, utilities and services were being undertaken by five separate government agencies under four government ministers:

- The Office of Olympic Co-ordination, within the Premier's Department.
- The Olympic Construction Authority, created from the Department of Public Works and Services.
- The Homebush Bay Development Corporation, created from the Property Services Group within the Department of Planning.
- Department of Sport and Recreation.
- Department of Planning.

However, these government corporations and departments immediately began positioning themselves and chaos ensued. These established and powerful government organizations wanted responsibility for the delivery of facilities, infrastructure, and so on, and were not prepared to be "subservient" to SOCOG, as existing infrastructure in Sydney had to be maintained and extended (both before and after the games)—and this was not only their domain, but as usual, were seeking use of the same limited source of funding!

The Property Services Group (PSG) was already appointed by the NSW government to review the development of Homebush Bay and especially the relocation of Sydney's existing (RAS) showgrounds to Homebush Bay. The Department of Public Works and Services had responsibility for managing the delivery of the Stage 1 Construction Works. The Department of Sport, Racing and Recreation was generally responsible for sporting facilities outside of Homebush Bay.

In late 1993/early 1994, the government created the Homebush Bay Corporation (HBC) primarily from staff already working within PSG. The HBC was then supplemented by staff from other government departments such as Transport, Electricity and Gas as well as managers from the private sector.

HBC was responsible for planning and developing Homebush Bay both up to the games as well as beyond. HBC also addressed the feasibility and manner of private sector investment (PSI), as it was then termed, in developing the facilities required for the games.

2.4.1 From Chaos to Rational Organization

The structure shown in Figure 2.1 was instituted at the time of the announcement. This structure was a recipe for chaos, and the figure does not even include SOCOG, which sat to the side of this structure.

In 1995, a newly elected NSW government decided to reduce the madness and created a single authority for the delivery and coordination of the capital works and infrastructure. This organization was called the Olympic Co-Ordination Authority (OCA), and its role was quite separate from SOCOG, which concentrated on the organizing and actual running of the games and for raising sponsorship funds.

A new organization was implemented. The government created a cabinet position of the Minister for the Olympics and put a very tough and demanding politician at the helm: Michael Knight. Knight was in charge of the OCA and SOCOG. At last, a project management—or, more precisely, a portfolio management—approach was in place and structured, and most importantly one leader was designated to run the shown in Figure 2.2.

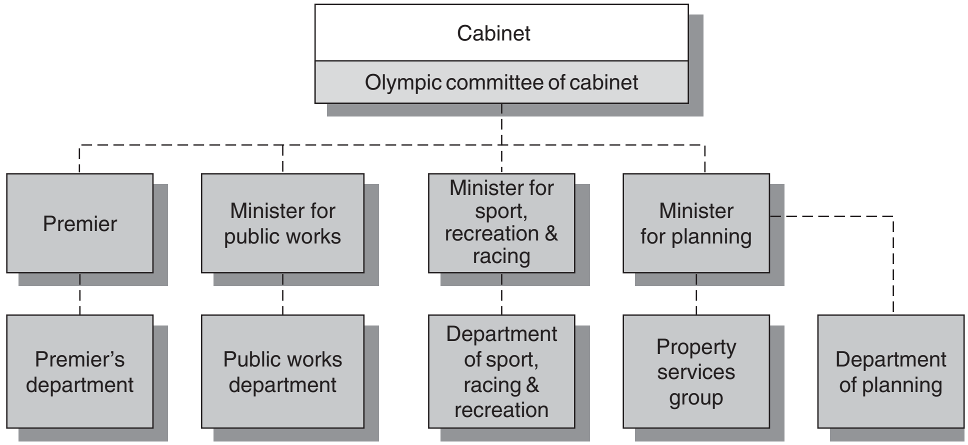

FIGURE 2.1 Government Olympic planning structure pre 1995.

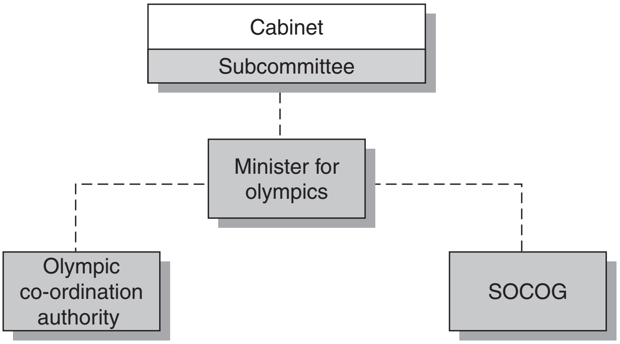

FIGURE 2.2 Government Olympic planning structure circa 1995.

Under the Olympics portfolio were now two subportfolios:

- OCA which was responsible for the planning and delivery of the Permanent Works or more colloquially phrased "Building the Theatre"
- SOCOG which was responsible for the planning, delivery and operations of the Games or more colloquially phrased "Putting on the Show."

2.4.2 Initial Planning and Delivery Options

As with any major operation or project, once the objective has been established and before we embark on executing the project, there is the *planning*. The planning process commences with the strategic followed by the tactical. Project planning for the games can be summarized, at the lowest level, in seven (7) steps; strategic; conceptual; operational; venue; testing and refinement; event; and finally, incident management and contingency planning. Although discrete in nature, (like any software or engineering project) these seven steps are integrated and there is a degree overlap between them.

Equally so, overall project planning and execution are *not* neatly segregated and the two tend to overlap. This was particularly true when comparing the different timelines between OCA and SOCOG as well as the many and varied programs within SOCOG. Many of the programs and projects were in the delivery stage whilst other related programs and projects were still in their planning stage. Therefore, whilst proper planning does need to precede and will result in better execution, project execution cannot afford to wait for perfection of plans, nor can the knowledge of ongoing development of the plans be used as an excuse for inaction—*time is of the essence*. The project must be delivered under the knowledge that information will always be less than perfect, key assumptions and decisions need to be made in a timely manner. Consequently, a degree of risk and "sweeping up" should be both expected and accepted. With effective project controls in place, these risks will be managed as the project progresses and planning assumptions are tested and confirmed.

While the bid documents and Host City Contract formed the basis of the project charter with the objectives clearly set out therein, understanding the scope of the project(s) and then laying out the path ahead were fundamental to delivering the games. Of equal, if not of more, importance to delivering the games was the need to focus on building up the management capabilities of the responsible entities.

The first objective was achieved through reviewing the assumptions outlined within the bid documents and understanding the basic operating parameters during the games. One aspect of this was the gathering of historical statistical information to determine the likely scope of a major international sporting event such as the games—10,000 athletes; 6,000 media representatives and journalists; 3,000 technical officials; and 2,000 IOC/NOC/ISF delegates. This high level of scoping would provide the initial demand profiles upon which the initial strategic plans and policies would be based.

The second objective was achieved through establishing the organizational structures and then recruiting the key management personnel as well as development of the corporate and communication systems and capabilities for the respective entities. In addition, The Games organizer would also decide on the most appropriate manner to procure and develop the requisite skills of the respective entities. The organizer would need to identify the extent to which it would procure the necessary resources from either the government or private sector or both.

Initial Planning. The initial planning focused on developing the Project Charter into many and various policies and scope statements.

In 1994, one of the first priorities was the creation of an initial SOCOG organizational structure across all programs. The structure was predominantly in line with the project breakdown structure for the games however the managers and staff generally filled more than one area of responsibility, until the relevant appointments were made.

The initial venue plans were reviewed and were used to confirm the strategies proposed for the games during the bid. These initial plans involved setting key priorities and milestones for the different sports following technical evaluations of major international sporting events and in consultation with the International Sporting Federations and the IOC Sports Department. An initial visit to the Atlanta Organizing Committee for the Olympic Games (ACOG) was also undertaken for study purposes and to establish a strong relationship with senior ACOG staff.

During 1995, as more detailed planning occurred, further revisions to the competition and venue plans took place. Concurrently, venue sites were also being reviewed as feasibility studies on the delivery of the venues were being conducted by the other government agencies. Changes in venue sites were then made in consultation with the relevant ISF and the IOC Sport Department when it was demonstrated that the change in venue was an improvement on the bid proposal.

In 1996, the Atlanta Olympic and Paralympics Games were staged and SOCOG's focus turned towards a technical evaluation of the Atlanta games. This involved the attendance of all competition managers, key staff from SOCOG Venue Management, and the placement of a number of SOCOG staff in key roles within ACOG to gain first hand experience. Also attending were representatives of OCA, other NSW government agencies, and existing venue managers. Collectively they undertook an extensive evaluation of the games across every facet of the organization and the games.

The technical evaluation of the Atlanta games, although costly and absorbing considerable management and staff time, provided an invaluable learning experience for all those who would be involved in the Sydney games.

With the end of the Atlanta Games in 1996, all eyes were now focused on Sydney for 2000. The path toward the Sydney Games had now turned another corner, and it was time not only to finalize the planning for the games but, more importantly, to ramp up the forward momentum toward the games. Strategy would give way to tactics. The strategic plans that had served the games organizers for the last three years would now need to be progressed to the next level of detail, albeit that the next level of planning was still conceptual.

Delivery Options: Government Involvement and Commitment. As part of Sydney's bid, the state government made two major commitments: the bid committed all Olympic construction to be undertaken by the New South Wales government, and any operating losses from the games were to be underwritten by the New South Wales government.

Further, the conduct and organization of an Olympic Games required a degree of mobilization of a city's physical and social infrastructure that demanded substantial public sector involvement. It required coordination and management of a wide range of public sector programs and resources at local, state, and national levels. It was simply not possible to stage an Olympic Games in a city like Sydney without the full support and active involvement of a large number of government entities.

Private Involvement and Commitment: Private Sector Investments. As any good commercial project manager would appreciate, it is important to understand the risk profile for a project and endeavor to offset risk such that those best capable of managing that risk do so. In delivering the facilities for the Olympic Games, the New South Wales government undertook feasibility studies on the major venues and identified three key areas of risk:

- The main Olympic stadium
- The Athletes' Village
- The multipurpose indoor arena

It was determined that the people best able to manage these large areas of risk were the private sector. The government was prepared to underwrite the games but did not wish to be a long-term manager of the venues nor did it want the full cost exposure and the potential of being "held ransom" over industrial disputes and delays.

Outsourcing to the Private Sector. Goods and services required for the games would be supplied by many companies and organizations. Some of these organizations were inherited with the Host City Contract as major sponsors of the Olympic movement with existing agreements with the IOC. Others would become sponsors through the development of SOCOG's marketing and sponsorship programs. The input of some organizations would be through traditional procurement and contracting forms. Finally, others would be involved through outsourcing arrangements.

Outsourcing, however, involved not merely a commitment to provide supplies or services to the games, but a commitment to supply specified *outcomes*. Naturally, the games organizers always remain ultimately accountable, but the supplier would be required to take on the responsibility to deliver a *result* for the games organizers, and not merely inputs to or only as part of an in-house team.

In deciding the best means of delivering specific requirements of the games, the organizers' (as is common with many governments) standard approach was to consider at the outset whether there was merit in an outsourced solution, rather than automatically creating an in-house capability. Where services have been outsourced, contracts or service level agreements (SLAs) would specify clear deliverables and service levels that the contractor must achieve. An in-house capacity was established to specify needs, to monitor and drive contractor performance, and to ensure coordination with other parts of the project. Some examples of the outsourced contracts for Sydney included bus transport, logistics, catering, cleaning, and project management.

2.5 THE VARIOUS ELEMENTS OF THE PROJECT

As with most major projects, the upper levels of the organization structure and the project breakdown structure for the Sydney Games became somewhat synonymous. Initially, two key organizations were established and made up the Sydney 2000 team at the core of delivering Sydney's Olympic Games: SOCOG and the OCA. Then, based on the lessons learned from observing the Atlanta Games, the ORTA was also established. All three organizations were interdependent, and over time their interaction and integration progressed to the point where all games organizing fell under a single banner called the Sydney 2000 Games Alliance.

The three organizations that formed the structural basis of Sydney's successful games effort were supported by two other organizations that also played crucial roles in the success of the games. OSCC and SOBO provided significant specialist support services integral to the Olympic task and due to their functions and reporting relationships formed a major part of the Sydney 2000 integrated team of agencies.

2.5.1 Sydney Organising Committee for the Olympic Games

SOCOG fulfilled the obligations of the Host City Contract with the IOC. Under its charter and the responsibilities given it by the SOCOG Act, SOCOG's responsibilities in relation to the games were as follows:

- Oversee the sports program, including preparing and operating all venues and facilities for the games
- Organize the cultural program
- Establish a marketing program in consultation with the IOC and the AOC
- Arrange and make available host broadcaster and television and radio facilities and other information services

SOCOG was responsible for the areas of sport competition, the Olympic villages, ticketing, sponsor servicing, technology, ceremonies, licensed products, press operations, protocol, the torch relay, arts festivals, and Olympic broadcasting (via SOBO).

Figure 2.3 shows the final pre-games organization structure of SOCOG.

2.5.2 Olympic Co-Ordination Authority

OCA was the main government agency responsible for delivering the facilities and infrastructure for the games. OCA's initial tasks were to deliver new facilities and venues for use during the games that also met the long-term social, cultural, and sporting requirements of the people of New South Wales, and to coordinate and monitor all New South Wales government activities in support of the games.

It was responsible for the planning, development, and management of 760 hectares of land at Homebush Bay as well as sporting facilities at Penrith Lakes, Horsley Park, Blacktown, Liverpool, Fairfield, and Bankstown. The OCA was responsible for creating the master plan for Homebush Bay (including Sydney Olympic Park). The master plan was released in 1995. OCA then became the planning approvals authority for the development of the various venues and sites within Homebush Bay.

OCA then managed the development and delivery of the Homebush Bay Infrastructure Development and new Sydney Showgrounds. Both of which were substantially planned, developed, and delivered between late 1995 to early 1998. Both of these projects were procured through commercial project management teams. The commercial project managers managed the designs through to schematics. The design development and construction was delivered under the various forms of contract management and/or packaged design and construct contracts. OCA also oversaw the private sector investment and delivery of the main stadium, olympic villages, and multiuse arena.

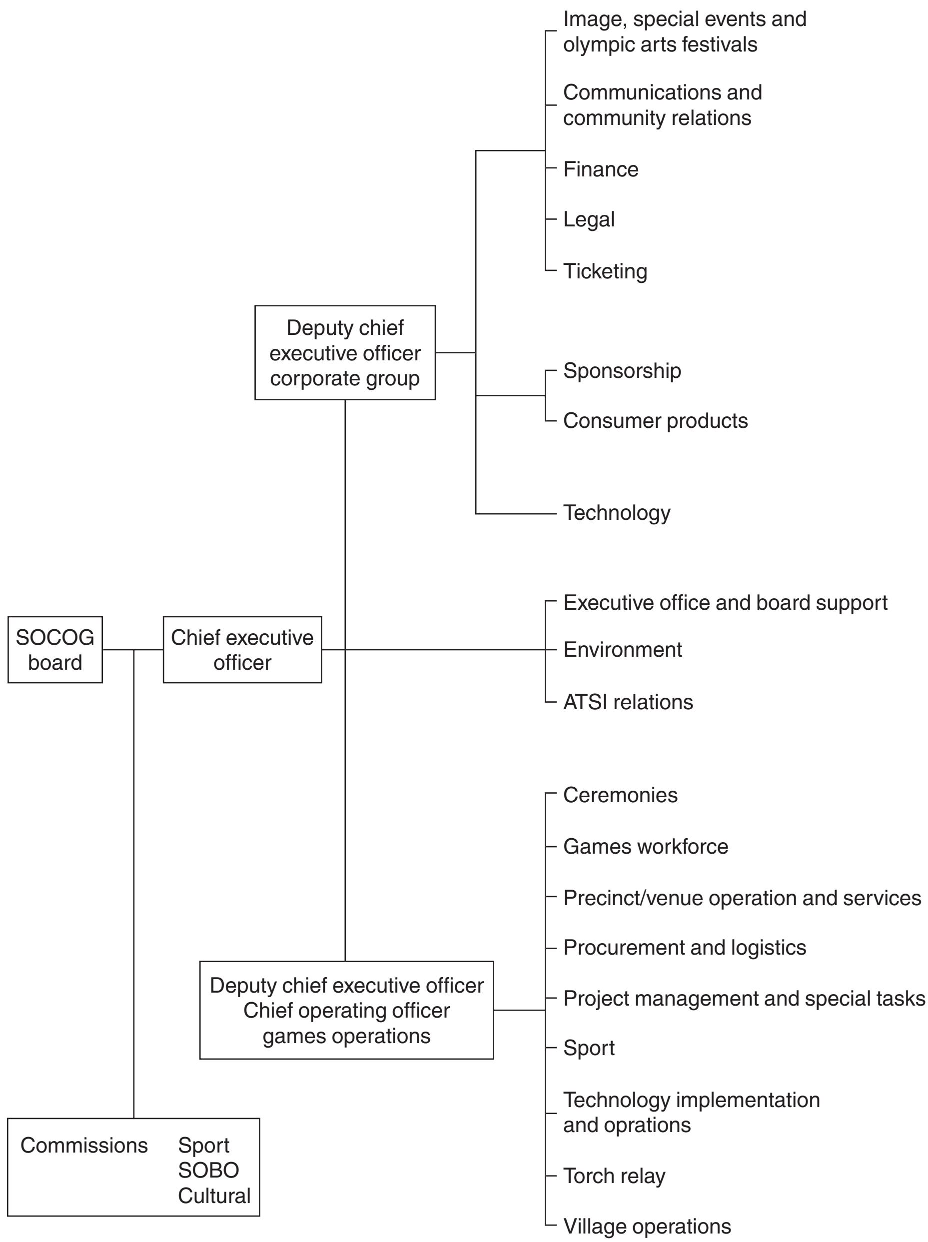

FIGURE 2.3 SOCOG organization structure (*Source:* The Official Report of the XXVII Olympiad, The Sydney 2000 Olympic Games).

By 1998, a major portion of the capital works were either completed or substantially progressed. By late 1999, OCA had delivered almost all of the permanent facilities and infrastructure. Around this time the OCA then managed the delivery of the Olympic Overlay and temporary facilities for the games.

The final pre-games organization structure for the OCA is shown in Figure 2.4.

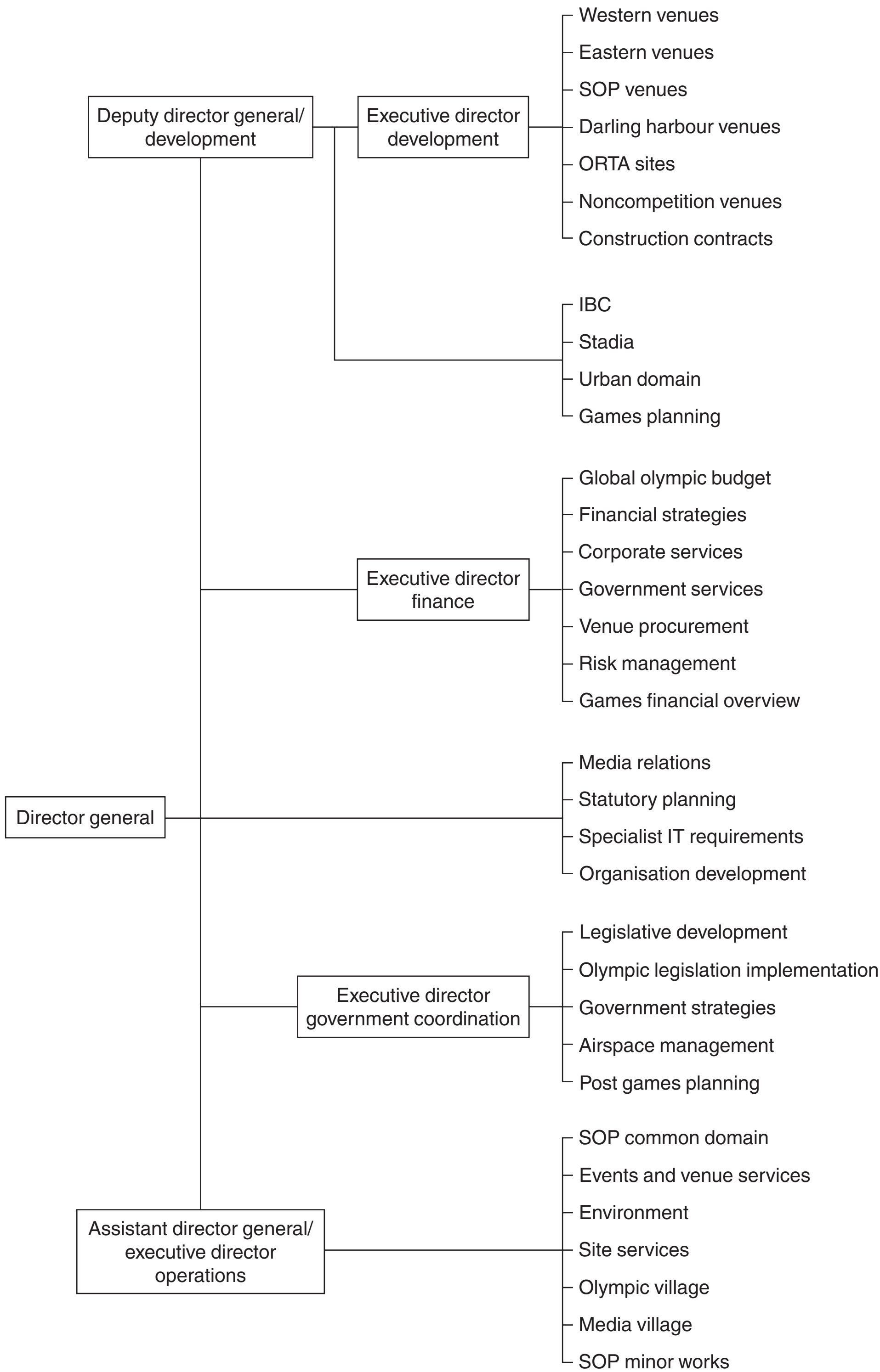

FIGURE 2.4 OCA organization structure (*Source:* The Official Report of the XXVII Olympiad, The Sydney 2000 Olympic Games).

2.5.3 Olympic Roads and Transport Authority

Sydney's Olympic bid included over 25 specific commitments relating to transportation. The bid commitments were reviewed in 1994 to produce an initial transport strategic plan. Then in 1996, following the review of the Atlanta games, it become evident that an effective transportation solution was an essential element of a successful games or put another way a high-risk element.

In 1997, ORTA was established by the New South Wales government to coordinate all ground transport services for the Olympic and Paralympics Games. It looked after the specific transport needs of VIPs, Olympic athletes and officials, and accredited media, as well as ensuring that the Sydney public and private transport networks continued to function smoothly and efficiently for Olympic spectators, commuters, and travellers. In this respect, ORTA coordinated the activities of a range of different transport organizations including rail services, the management of the road system, the procurement of Olympic buses and drivers, and Olympic bus and car fleet management.

The final pre-Games organization structure for ORTA is shown in Figure 2.5.

2.5.4 Olympic Security Command Centre

OSCC was responsible for devising and implementing security arrangements for the games. The actual security task was undertaken by the New South Wales Police Service, assisted by contract security personnel, members of the Australian Army, and a number of security volunteers.

Initially, an Olympic Security Planning Group (OSPG) was established in May 1995. OSPG researched Olympic security-related issues under five general sections: crises, operations support, emergency response, Olympic venue operations, and community policing. The 1996 Atlanta Olympic and Paralympics Games proved to be a key developmental experience highlighting the enormous scope of security operations. OSPG was renamed the Olympic Security Command Centre (OSCC) in July 1997 and held status of a separate police command.

An Olympic Intelligence Centre was created within OSCC in September 1997. It provided a link to the Australian Security Intelligence Organisation (ASIO) and an intelligence-based risk management methodology that identified and prioritized all games-related risks and enabled the effective deployment of security resources to treat and minimize security risks.

The basic conceptual and strategic framework for Sydney 2000 Olympic planning was released in July 1997. Five key documents detailed guided security planning: Security Concept of Operations, Security Strategic Plan, Preferred Security Position, the OSCC Business Plan, and the "Dual Model" of Security.

The principles guiding security planning were established to do the following:

- Protect the integrity of international entry and accreditation processes to ensure they were consistent with security and Australia's existing policies.
- Ensure all accredited persons were subjected to appropriate background checking procedures.
- Restrict sensitive areas to accredited persons.
- Sanitize all Olympic venues and sites for the presence of explosive devices after lockdown of the venue by SOCOG, and resanitize as required on the basis of specific risk.
- Impose random, but carefully targeted, screening procedures using metal detectors and searches of hand-carried items, under the supervision of NSW Police officers, for all spectators entering Olympic venues and sites.
- Apply more thorough checking procedures of all people and items entering higher risk areas such as the Olympic Village.
- Apply strict and consistent zone controls within each venue and site, aimed primarily at the protection of the Olympic family and VIPs.
- Impose strict and consistent controls on the entry of vehicles and commercial materials into all Olympic venues and sites.

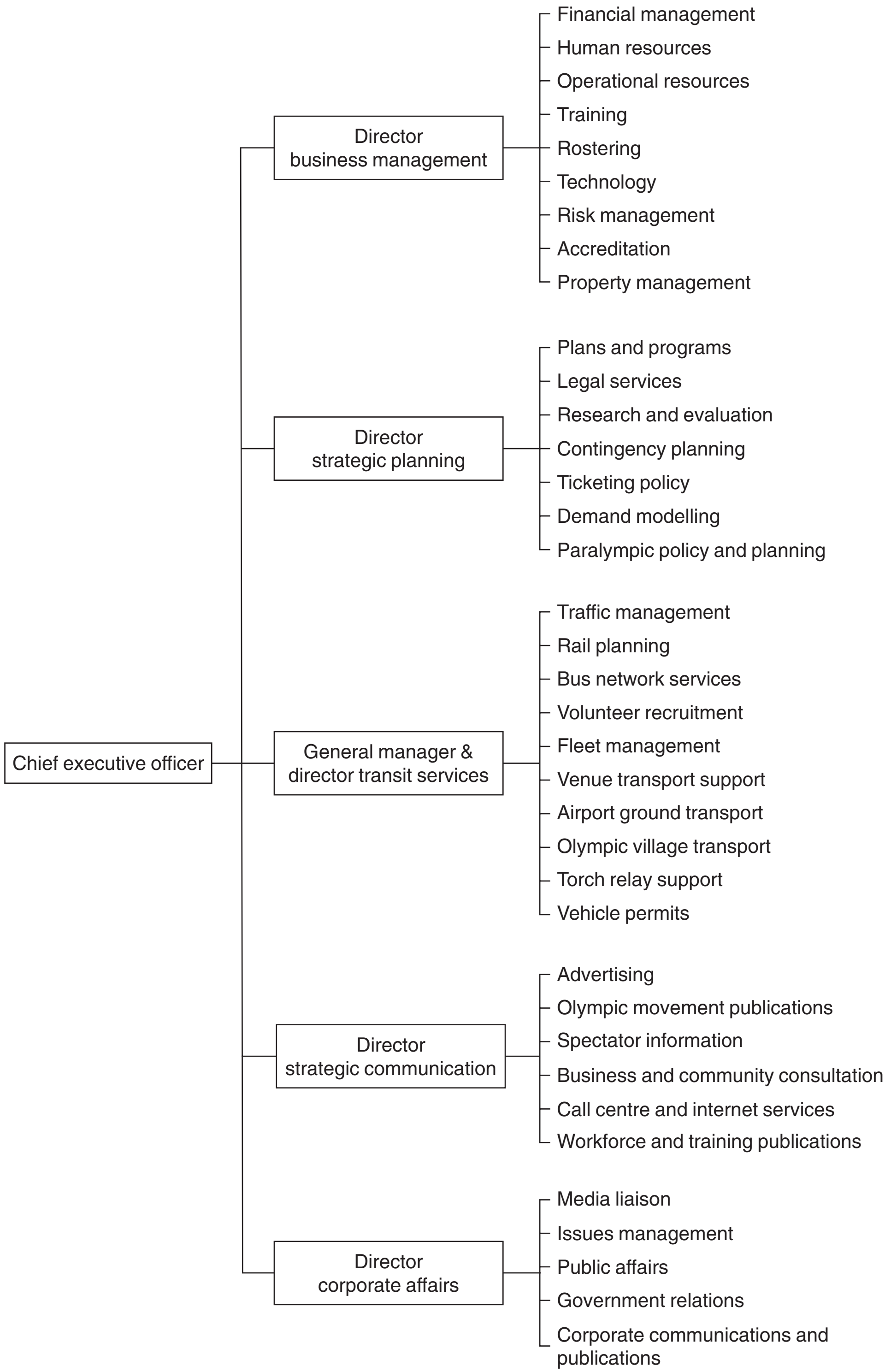

FIGURE 2.5 ORTA organization structure (*Source:* The Official Report of the XXVII Olympiad, The Sydney 2000 Olympic Games).

All Olympic security personnel were integrated under the command of the NSW Police Service, with the commissioner for police in control of operations. The security workforce peaked at approximately 11,500 and included the Australian Defence Force, private security, and volunteers along with the police officers.

2.5.5 Sydney Olympic Broadcasting Organisation

SOBO was the host broadcaster responsible for televising the Sydney 2000 Olympic Games to an estimated cumulative global audience of 30 billion people. SOBO's role was to provide coverage of every Olympic competition for the 200-plus broadcast organizations that were television and radio rights holders.

SOBO began its operations in 1996, and from February 1997 recruited staff from within Australia, the United States, and Europe. Many staff had previous Olympic broadcasting experience. By games time, staff numbers reached 3,500, approximately 200 of whom worked full-time.

SOBO was responsible for producing the international television and radio coverage of every Olympic event as a service to rights holding broadcasters (RHB's) who purchased the Olympic broadcast rights from the IOC to broadcast the games in their respective countries.

2.6 THE PROGRESSION OF GAMES PREPARATION AND MANAGING CHANGE

As with any major project, after breaking the project scope and organization down into it's many component programs, projects, subprojects and elements, the challenge is then to coordinate the relationships and communication lines between the multitude of managers, staff and stakeholders. In addition, this needs to be managed through the various phases leading up to the games. Then finally, integrating the services and functions across the many competition and noncompetition venues.

2.6.1 Organizational Evolution: Functional Teams to Venue Teams

In 1997, SOCOG's organization structure was based on the project breakdown structure at that time and was related to specific functional areas or programs. Each program had its own budget, staffing, equipment, and business plan. Whilst there were forums for communication between the programs, each program tended to operate as a silo. However, at games time SOCOG would predominantly be a venue-based organization, and each program's function would need to be integrated into a venue team.

The venue teams would also need to operate in conjunction with other agencies' activities that would be integrated at the venues (OCA, ORTA, OSCC, SOBO etc.). In addition, the operations of each venue would need to be coordinated with the area outside the venue, referred to as the urban domain, plus the overall support systems and networks that would need to be coordinated to feed the functional services for all the venues.

In order to evolve SOCOG's organization structure from one that was based on the thirty (30) or so programs to one that would be based around the 140-plus venues, a process of "venuization" was instigated. It would then become the responsibility of the Precinct/Venue Operations Division to transform SOCOG from organizational planning and evolution to operational planning and integration.

Relationships between Programs and Venues/Precincts is shown in the above high-level Responsibility Assignment Matrix (RAM) diagram in Figure 2.6. Each of the nodal points in the RAM diagram represents a program area representative, who would have had two reporting lines—horizontally, reporting to the program manager and vertically, to the venue manager.

In addition to coordinating the management of vertical line reporting, the Precinct/Venue Operations Division managed the evolution of the venue teams required during the games. Each of the venues was then managed by the venue manager, who was the key integrator of all functions and the leader of the venue at games-time. The venue manager reported directly to the general manager, Precinct Venue Operations. The venue manager also had access to the Main Operations

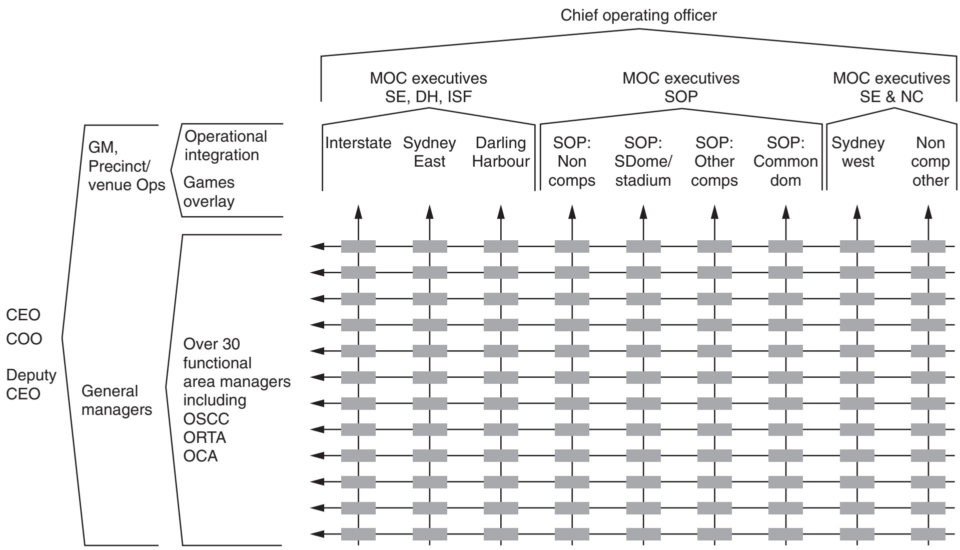

FIGURE 2.6 Operational integration matrix (*Source:* The Official Report of the XXVII Olympiad, The Sydney 2000 Olympic Games).

Centre (MOC) executives, whose would assist the venue manager in problem-solving and to address issues with implications beyond the venue.

Similar main operations centers would also exist for areas such as security, urban domain, and transport to deliver both Olympic and non-Olympic services during the games. During games-time operations coordination between these MOCs occurred through an overarching Games Co-Ordination Group (GCOG).

It was neither practical, nor cost-effective, for SOCOG to evolve straight to the venue teams during the operational planning phase. SOCOG's evolutionary approach to becoming a venue-based organization is summarized diagrammatically in Figure 2.7.

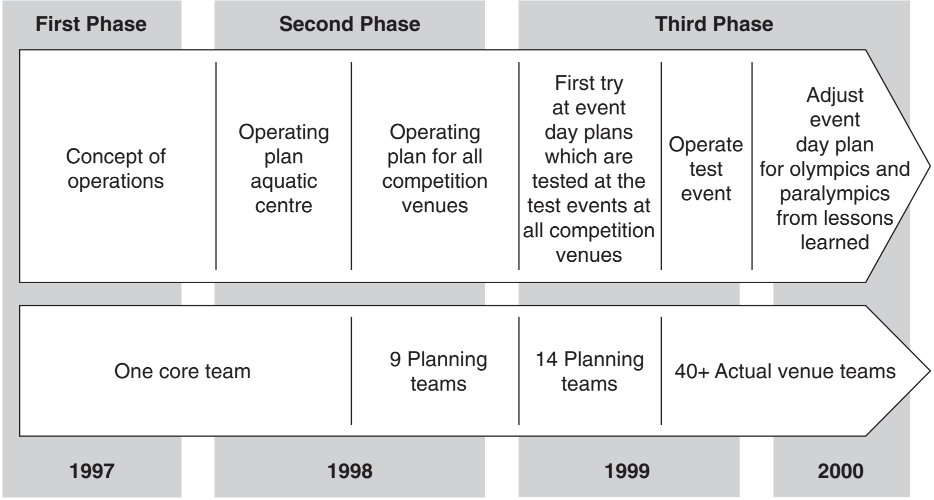

FIGURE 2.7 SOCOG's steps toward venue-based organization (*Source:* The Official Report of the XXVII Olympiad, The Sydney 2000 Olympic Games).

2.6.2 Organizational Integration

Initially, OCA was responsible for the delivery of permanent venues and SOCOG was responsible for all aspects required to adapt the venues for Olympic use. However, in 1997, with the permanent works construction program in hand and expected to be completed by 1999, it was recognised that OCA had established facilities and organisational structures that could be extended to include the Olympic overlay. It was decided that OCA would manage the design and construction of all games overlay requirements within a guaranteed maximum price (GMP). Subsequently, OCA assumed full responsibility for all overlay activities and funding, including managing the overlay installations during the games, with OCA and SOCOG teams working on an integrated program to deliver games-time site and venue management services, respectively.

The following strategy was put in place:

- Operational planning was to be conducted by SOCOG, resulting in concept designs and detailed cost plans.
- Planning was to be done on a precinct basis; development managers were appointed with responsibility for each precinct.
- Noncompetition venues would be planned concurrently with the competition venues.
- Focus of design was to find operational solutions to SOCOG requirements and develop plans that responded to the dynamic nature of the event.

In March 1998, design consultants were commissioned to work with the operational planning teams and assist in documenting the scope of work and develop the concept designs. A review process in October 1998 identified solutions to the high cost of games overlay at some venues. Operational planning was substantially completed by the end of 1998.

Once the scope was established, each venue underwent a value-engineering exercise with OCA to reduce costs and, where relevant, standardize items across venues. The value-engineering scope and corresponding estimates were reviewed by senior management of OCA and SOCOG and then approved. The concept scope of work based on the value-engineered brief was forwarded to OCA. OCA prepared a detailed bill of quantities reflecting the agreed scope; this, together with the concept design, formed the brief for the detailed design and construction phase of the overlay.

OCA then procured and appointed commercial project managers to manage the design development and delivery of the overlay works. The overlay works were managed as trade packages for each of the venues. OCA was also the statutory planning authority and issued planning approvals for each overlay project.

Integral to these processes, was the link with the activities of SOCOG's Procurement Division and Technology Division to commence the process of sourcing and purchasing items to be supplied within and around the overlay and to coordinate through OCA the activities of utility suppliers and, through SOCOG, the games technology partners. OCA's project managers were required to liaise with SOCOG's Procurement Division and Technology Division to coordinate delivery of SOCOG's Sponsors supplied items, for example, temporary tent structures, ICT networks and equipment.

2.6.3 Games Alliance

From the early days in late 1993, where chaos seemed to prevail, to mid-2000, the organisational structure that would deliver the Sydney 2000 Olympic Games had evolved, with significant operational integration occurring across all Olympic agencies in the nine months prior to the games.

The "Sydney model" had the following key elements:

- The games were financially underwritten by the government of the state of New South Wales.
- A formal and explicit relationship between the Organising Committee, the NSW Government, and the Commonwealth of Australia was created.
- The inherent limitations of an entity such as the Organising Committee to mobilize all the resources needed for the games, no matter how well it manages its core responsibilities, was recognized.

- Specific-purpose entities were established—such as OCA, ORTA, OSCC—and performed specific tasks, and these entities eventually came together under the banner of one integrated team.
- The strong state and commonwealth government coordination mechanisms were backed as far as possible by legislation.
- A planned and structured approach was undertaken to urban domain management, including major city celebrations.
- A Global Olympic Budget (government plus SOCOG) was prepared and reported.
- The coordinated and integrated structure for games-time operations through the Games Co-Ordination Group was chaired by Minister for the Olympics.

In December 1999, the Games Co-Ordination Group (GCOG) was established, bringing together the top executives of the key agencies responsible for staging the Sydney 2000 Games. This group comprised the Minister for the Olympics and President of SOCOG Minister Knight; the chair of the SOCOG Sports Commission and President of the Australian Olympic Committee John Coates; OCA Director-General and Deputy David Richmond and Mick O'Brien; SOCOG CEO and Deputies Sandy Hollway, Jim Sloman, and Michael Eyers; ORTA CEO and Deputy Bob Leece and Geoff Amos; and the Police Commissioner and the head of the OSCC Commissioner Peter Ryan and Commander Paul McKinnon. At games-time the commission was joined by the CEO and Chief Operating Officer of SOBO Manolo Romero and Gary Fenton.

GCOG provided the high-level forum where critical inter-agency issues could be resolved, in a coordinated manner, and the requisite actions directed. During games time it acted as a catalyst for identification and resolution of major risks and provided a trouble shooting role as well as fulfilling the reporting obligations to the IOC.

2.7 TESTING THE PLANNING THEORIES, COMMISSIONING, AND MOVING TO SHUTDOWN

A year out from the games, and the delivery program seemingly under control, the focus for the final phase is the operation of the games itself. The operational plans, assumptions, and models that have been developed and refined over the last six years can now be tested within the venues. As with any major event, a major element of success lies in the testing of the plans plus the contingency planning and logistical assumptions that are necessary to manage the event and the 100,000 plus people involved in staging the games.

2.7.1 Major Initiatives in 1999: Test Events

SOCOG's Test Event Program was an essential aspect of the preparations for the Sydney games. SOCOG had organised 40 test events during 1999 and 2000, including 11 simultaneous test events in "Super September" 1999. These events were designed to test different elements of the games time operational plans for SOCOG and the other agencies.

Test events allowed SOCOG to meet three major objectives:

- Test the field of play and all elements involved with the competition as well as various aspects of the venue.
- Provide a test of technology systems for all sports at all venues, including specific scoring, timing, and results systems and communications.
- Train staff, contractors, and volunteers in an event environment and develop specific venue teams for games-time.

A key aspect of the test event programme was the 1999 "September Cluster" featuring test events for 11 sports. The 1999 September cluster arose from SOCOG's Technology Division requesting a cluster of test events at which systems could be tested simultaneously across many venues. The 1999 September cluster involved over 4,000 athletes and required a workforce of more than 6,500 people.

The experiences gained during the test events lead to significant reductions in operational risks and the ultimate operational success of the Sydney games. The significant investment required to prepare and conduct the test events provided an invaluable tool in preparing all the organizations for games-time.

2.7.2 Event Contingency and Test Planning

By mid 1999, the Venue managers had been appointed and games-time reporting structures had been established. The focus for the venue teams was centered on four-week cycles of detailed planning. With each cycle revisions to policies and procedures would be identified and assignments allocated to each venue team requiring a greater level of detail in the operational planning. (See Figure 2.8)

The last stage of operational planning is the event plans. Throughout 2000, the venue teams under went a rigorous process of fortnightly reviews of the event plans and contingency plans.

Beginning in August 2000 the 60 day games-time period commenced. The Venue Managers were given control of their respective venues and games-time operations of the Precinct/Venue Operations Division were decentralised to the venues. Prior to the games the venue teams were responsible for the final Bump-In of furniture, technology, overlay, and staffing. The venue teams also focused on the final contingency planning as well as conducting real-time exercises. The last two weeks of August involved rehearsals and volunteers' venue training. Then in the first two weeks of September 2000 All the venues were locked down and the Athletes could commenced their training at the venues.

2.7.3 Logistical Support

To service the major supply and logistics needs of the games, a 25,000 square meter site was established 2.5 km from Sydney Olympic Park. The Olympic Games Logistics Centre provided centralized information, coordination, scheduling, warehouse storage, and marshalling yard facilities. It was critical to the overall success of the games and was utilised by SOCOG, ORTA, and sponsor organizations throughout 2000.

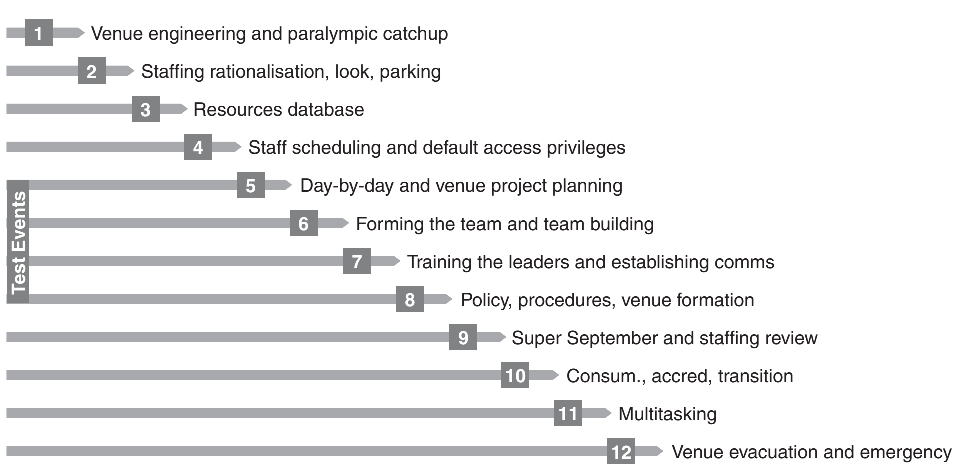

FIGURE 2.8 Graphic representation of a four-week planning cycle (*Source:* The Official Report of the XXVII Olympiad, The Sydney 2000 Olympic Games).

Scheduling of deliveries within Sydney Olympic Park was complex. This included coordinating the movements of 350 semitrailers making more than 500 deliveries of 2,500 tons of freight to 50 delivery points through the park in close cooperation with the Homebush Bay Operations Centre. Restocking of venues could only take place between the hours of midnight and 6 A.M. A master delivery schedule was created for each venue to coordinate and manage venue security and access, compliance with game-time road restrictions, and avoidance of delivery delays.

2.8 THE APPLICATION OF PROJECT MANAGEMENT PRINCIPLES TO DELIVERING THE GAMES

The chief operating officer for SOCOG, Mr Jim Sloman, outlined the key differences between the traditional project management role and the role in a major event environment:

- Project management requirements will change over time.
- Multiple venues will operate concurrently.
- Very different (and potentially conflicting) requirements of constituent groups.
- Balance to be found between operating and capital costs.
- Timing issues—planning for overlay while operational planning progresses.
- Immovable event date.
- Cost and supply issues including lack of certainty about budget, sponsorship and other supply issues, and managing a global budget versus multiple facility-specific budgets.

He also outlined the major challenges for the Project Manager as follows:

- Issues arising from major event specific obligations—such as sponsorship agreements
- Reconfiguration issues between events
- Procurement issues, especially regarding venues
- Testing the venues
- Balancing the many platforms—tracking functional progress
- Tracking progress sensibly for multiple venues—tracking venue progress
- Ensure that all planning is integrated, logically linked, and consistent
- Assembling a major event workforce
- Developing the technology solutions
- Procuring the goods, services, and equipment
- Working under intense international media and community scrutiny
- Keeping the "franchiser" informed on progress
- And in the final year, becoming operationally prepared

While on the surface these may look like the important considerations for many major projects, keep in mind that these issues revolved around a two-week event with no second chances and involved the management of more than 150,000 individuals of differing skills and capabilities, most of whom were essentially untrained before the games and inexperienced during the games.

Sloman then went on to conclude the following:

> "The role of the Project Manager in the context of a major sporting event is very broad and encompasses much more than the traditional time and cost management responsibility. It is about understanding how the event will be operated, identifying and tracking the linkages between the many and disparate streams of planning, balancing the needs of constituent groups, tracking progress across functional areas and across multiple, linked venues within a total organizational framework."

This is consistent with the basic requirements of the project manger as outlined in the Project Management Institute's *Project Management Body of Knowledge*.

2.8.1 Managing Time

In the early phases the programs were generally centrally prepared and maintained. The role of the various organizations' Project Management Offices (PMOs) was to prepare generic programs highlighting the key deliverables and milestones in preparing for the games. However, as the different program managers were appointed, the planning responsibility followed the delivery accountability and thus lay with the program managers. The PMO would then assume a coordination and conformance review and reporting role.

These programs were centrally monitored. Coordination between the different program managers was primarily coordinated through connecting key interfacing milestones on each of the programs. Olympic overlay programs were centrally reviewed to ensure the demand for resources and supplies were sufficiently leveled to ensure timely supply. Games time planning was carried out to the minute with running sheets and schedules.

2.8.2 Managing Costs

In late 1995, Tracey Brunstrom & Hammond Group were commissioned by the OCA to lead an extensive review of the project plans and budgets for all of OCA's capital works projects as well as its operational noncapex expenditure. While the review ultimately addressed the completion cost estimates, its primary focus was to review and analyze the level of maturity for each of the individual project management plans, especially the project's scope, time, and risk functions.

In May 1996, OCA released the details of the budgetary review of the costs of Olympic construction, which found a series of shortcomings in the bid budget. The budget review was based on a further developed understanding of the Olympic requirements and the physical parameters for development of sites and procurement methods than existed at the time of the bid.

The original bid budgets for facilities was in the order of (Aus) $1.7 billion, when escalated to the 1996 figures with the revised forecast construction costs at that time of (Aus) $2.3 billion—a variance of (Aus) $600 million. The budget was approved by the government at (Aus) $1.9 billion, leaving an OCA controlled contingency of (Aus) $400 million. The final end construction cost was (Aus) $2.24 billion.

The major reason for the variance in the cost estimates was a decision to accelerate the relocation of the Sydney Showgrounds from Moore Park to the Homebush Bay site. This was a strategic decision to provide a future function on the Homebush Bay site other than sport and would continue post Olympics. The Sydney Showgrounds are the home of the annual Royal Easter Show, where the agriculture of New South Wales "Visits the Big Smoke" and generates 1 to 1.5 million visitors over 16 days.

The Showground facilities were used for baseball (in the new showring), basketball preliminaries, volleyball, handball, rhythmic gymnastics, modern pentathlon, badminton, and training in the many and various pavilions. The new Showgrounds commenced construction in September 1996 and were completed in March 1998, for a (Aus) $390 million construction cost over 19 months. The strategy behind the early construction of the Showgrounds was to allow the Easter Show in April 1998 to be held at Homebush Bay so that the new rail and public transport systems built for the Olympic site could be tested in a live situation. In order to achieve this objective, the design and construction of the Sydney Olympic Park Infrastructure including all utilities, road and rail, also had to be accelerated. The Infrastructure works commenced in September 1996 and were substantially completed in March 1998, for a (Aus) $300 million construction cost over 19 months. This strategy allowed a well-developed transport system that had been substantially tested to be in place well before September 2000.

This strategy was further extended virtually to all aspects of the delivery of facilities such that all major sporting venues and the transportation and security systems were in place and had been used by the public for at least one year prior to the games. In order to achieve this objective all the facilities and associated infrastructure had to be completed well in advance of the games and games planning. This meant that key assumptions regarding Olympic use were required during the delivery of the facilities and infrastructure and some minimal rework was required. This strategy was possibly one of the most significant contributing factors to the successful delivery of the Olympic Games.

Prior to 1997, SOCOG's Project Management Group, was focused on early program planning, definition, and observation of the Atlanta Games, and supervised the financial planning function. The first SOCOG post-bid budget was prepared in 1997.

Thereafter, the budget management and financial planning responsibilities were given to Finance Division. SOCOG undertook four formal major budget reviews:

- April 1997: first post-bid budget revision, following observations made at the 1996 Atlanta Olympic Games and planning completed to that date
- June 1998: bottom-up budget reforecast
- June 1999: budget rebalancing caused by projected sponsorship revenue shortfall
- February 2000: budget rebalancing caused by further projected revenue degradation

A Budget and Program Review Committee was formed in 1999 and carried over to early 2000. This committee was entrusted with reviewing SOCOG programs and commitments and reassessing priorities with a view to cutting expenditures and reallocating funds to areas in most need. Close liaison and monitoring of program budgets was the essential ingredient for this exercise.

From June 2000, the Finance Division revised contingency and program reporting requirements. Contingency drawdowns were restricted and program managers reported to the general manager of finance on a fortnightly basis to forecast program outcomes and to recommend financial reallocations. Excess funds were allocated to contingency but stringent requirements had to be met to draw from contingency. The general manager updated his risk assessments to the Finance Committee from these returns.

A simple but important tool at this stage for financial management purposes was the register of committed expenditures. A simple earned value technique which could be related directly to the program managers' returns. By June/July 2000 it was evident that many programs would not realize their full returns as the percentage of committed expenditure so close to the games was too low when related to approved total program budget.

At Games time many of SOCOG's finance staff were allocated to venues to manage financial operations at this level. This led to considerable difficulty in maintaining central finance systems, including the record of financial commitments.

Following the games, staff finalized commercial arrangements and worked towards reconciling SOCOG's final financial position, After its final meeting in December 2000, the SOCOG board announced that it would be able to return (Aus) $30 million of the (Aus) $140 million contingency underwriting to the NSW government.

2.8.3 Managing Risk

The SOCOG Risk Management Program identified risks impacting on the operations of the Sydney 2000 Olympic Games and developed strategies to minimize these risks. In December 1996, the program was established within the Finance Division.

In view of the broad and extensive support required from government, OCA established a Risk Control Review Group to coordinate government's overall response to games risk. As underwriter of the games, government maintained a close overview of SOCOG's insurance program and risk management strategies, especially those directly relating to SOCOG's financial risk. Government engaged SOCOG's external risk advisers to assess the increased risk imposed by the games and advise on risk mitigation strategies. This engagement facilitated overall integration of risk management for the entire spectrum of games issues.

2.9 THE OUTCOME: A SUCCESSFUL GAMES!

Sydney 2000 in those two weeks of September was an undeniable success. Juan Antonio Samaranch's closing words "the best Summer Games ever!" may be a bit over the top, but Sydney is still basking in the sunshine—or perhaps it is just the weather?

2.9.1 What Was Achieved

Apart from the immediate success of the Sydney Games, the event achieved much more for differing reasons, including the following:

- The quality venues and facilities are reused each year for major sporting and cultural events.
- Sydney was exposed to the world stage.
- Sydney Olympic Park is enjoying the next wave of urban development.
- Australia's construction industry gained extensive macro projects experience under an extremely tight schedule and budget regime.
- The Homebush Bay Recycled Water Treatment Plant continues as a success and model for other Brown and Green-field developments in Sydney.
- The Ecological Rehabilitation Strategy and Ecology Databank were developed as part of the games and are being used today to monitor the Home Bush Bay ecological system.
- Australian project managers, consultants, contractors, and suppliers continue to share their expertise with the world—Athens, Beijing, Doha, Manchester, Rio, Salt Lake City, and London.

2.9.2 Lessons Learned

The Sydney model and many of the strategies adopted in Sydney have been reproduced at other Olympic Games. More specifically, the following ideas have evolved from the Sydney Games:

- The IOC has adopted and established the Games Transfer of Knowledge Program.
- New concepts have been introduced in staging the games, such as more use of temporary facilities versus permanent facilities.
- Sydney 2000 is arguably the benchmark for future Olympic Games (or at least possibly until Beijing in 2008).
- The NSW government gained extensive experience in procuring PSI and PPP projects.
- Australia's private sector and construction industry have gained extensive experience in delivering PSI and PPP projects.
- Numerous alliances and joint venture arrangements and an overall spirit of cooperation created during the preparation for the games by many commercial organizations, including designers, contractors, and project managers (putting traditional and commercial rivalries aside), resulted in both excellent solutions as well as a win-win for all participants. This ethos has been consistently and successfully repeated on major projects in Australia and around the world.

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CHAPTER 3
PROJECT MANAGEMENT IN AOTEAROA (NEW ZEALAND)

Stephen Harrison

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3.1 NATIONAL HERITAGE

Legend states that Maui stowed away on his brothers' fishing boat and revealed his presence once they were too far from home to return. He urged them to travel further to sea. After the brothers had finished their fishing, Maui used his magical hook to pull the North Island of New Zealand from the ocean. An argument between Maui and his brothers created the rugged terrain. New Zealand is referred to as Aotearoa, the land of the long white cloud, because Kupe, the great Polynesian explorer, discovered it after sighting the cloud that covered it.

A small island nation of 4.1 million people, New Zealand is situated some 1,000 miles to the east of Australia. It was settled as a British colony in the late eighteenth and early nineteenth centuries by free settlers. A formal treaty with the Maori, the native people of the land, was reached on February 6, 1840. Principal exports include dairy products, meat, forest products, machinery, fruit, and fish. Top export countries include Australia, United States, Japan, People's Republic of China, and the United Kingdom.

New Zealand's isolation, beautiful but rugged terrain, and small population mandated the development of hardy qualities. Innovation, self-reliance, and competitiveness are essential ingredients of the national psyche. As a developed nation New Zealand is

- Too small to call the shots politically or economically
- Too isolated to have ready access to markets
- Traditionally outspoken and diplomatically feisty on social and political issues, which has resulted in a reduction in preferential access to trade and other relationship benefits with key trading partners
- An open market offering other nations ready access for their products without there necessarily being reciprocal access rights for New Zealand's goods and services in their markets
- Reliant on ingenuity, innovation, and problem solving to overcome challenges—a cultural heritage rather than purely learned skill

3.2 CULTURAL ROADBLOCKS TO PROJECT MANAGEMENT

In March 1994, the Project Management Institute of New Zealand (PMINZ), chapter gained charter. By 2006, the membership had grown from the original 29 members to more than 1,300. PMINZ is currently a successful component of PMI with programs that include regular meetings in multiple centers, an annual conference in its twelfth year, and a very active program for assisting those preparing to take the Project Management Professional (PMP) exam. Project management is reasonably well recognized, and those who have embraced project management understand its value. That said, PMI and project management as a formal discipline is still a fairly well kept secret, though the title "Project Manager" is bandied around by all and sundry.

Observation has highlighted reasons why some organizations are resistant to adopting project management. While these are certainly not universal in New Zealand, nor are they restricted to New Zealand, they nevertheless place a spotlight on some key behaviors and attitudes that must be overcome for project management to be successfully adopted:

- **"Not created here."** As a cultural mechanism, this stems from the fiercely competitive nature of the New Zealand psyche. Whether it is for sport, business, or another activity, a misapplied sense of innovation and competitiveness can lead to the exclusion of solutions from outside sources. Rather than harvest and use the wealth of ideas available from reputable sources, a few ideas may be identified and introduced, but then the doors close while the ideas are massaged inside the organization. Lacking the full understanding of how best to apply the project management disciplines and requiring solutions to be home grown can result in less than optimal results. Because of such an approach, some say that project management has been tried but does not work.
- **Reward heroes.** The savvy project manager develops and implements a plan that makes sense of a dynamic environment and manages risk to reduce chaos. Ideally, the project manager is not seen or heard by the organization because of the smooth, effective, and seamless implementation of projects under the person's leadership. In a culture of heroes where braving the elements, saving others from peril, and charging across no man's land in the heat of battle to defeat the enemy are among cultural symbols that are recognized and rewarded, managing a project effectively, and therefore unseen in heroic terms, can be at odds with what organizations reward. Such a cultural environment can discourage planned or disciplined approaches and may even encourage crises to occur so that the project manager is seen to act as the hero.
- **"Fix is better than prevent."** Fixing an identified problem is far better than investing in planning to create a sound solution. The results conveys the message, "We don't have money to plan, but we do have money for rework." The New Zealand culture recognizes and acknowledges the innovative capabilities of the farmer to fix anything with number 8 fencing wire. It is the New Zealand equivalent of the TV hero Mac Gyver. The attitude manifests itself as, "If we don't plan and it works, great. If it doesn't work, we will fix it. Either way, we didn't waste time with planning." All too often, project managers receive the message from management that results are expected—and planning is not results.

As cynical as these statements may seem, the amazing truth is that people are often rewarded for reacting to a crisis that was largely avoidable with a little forethought, planning, and discipline. Fortunately, some approaches have been implemented that did make positive differences for the projects concerned.

3.3 PRACTICAL EARNED VALUE

The application of earned value management (EVM) in the commercial environment is still rare. It is quite common to encounter projects reporting progress in terms of money spent against planned spending without any connection to work actually performed. The difficulty for most projects in which disciplined project management is given only lip service is that EVM requires that sound project management disciplines be applied, such as establishing the technical, schedule, and budgetary baselines, and implementing and adhering to a change management system. To those organizations for which planning is treated as a hindrance, valid performance reporting does not stand a chance. Why risk losing hero status by reporting facts that may paint an alternate image?

The primary project used as the basis for the following examples was a large IT project by New Zealand standards, with a budget in excess of U.S. $150 million, implementing a new network over an existing one. It had been running for more than 6 months and was due for completion within 18 months. The project had been broken down into a number of subprojects, each covering a major technical or business area. Run and actively managed by the customer, rather than the supplier, the customer had approximately 100 full-time staff on the project. In addition, more than 1,000 contractors were involved.

Both the customer and supplier used a full-time team of schedulers using entry-level project scheduling software. They had a significant challenge planning, monitoring, and accurately determining project progress. Correlation of schedules between customer and supplier was achieved by conducting frequent meetings to review and ensure the approximately 5,000 milestones had corresponding schedule data.

EVM was implemented into this challenging environment. Additional characteristics of the project that made this a challenging exercise included the following:

- Inconsistent levels of planning had been performed across the project.
- Not all required work had been identified, let alone planned in detail.
- A large proportion of activities were treated as level of effort (LOE) rather than being appropriately broken down into manageable packages of work.
- A label on the schedule representing a task was in general the most detailed documentation available for most activities.
- The project was in a permanent state of flux; no baseline had been established.
- No correlation existed between schedule activities and the control accounts against which estimates had been made or that actual costs were collected.
- Other poor scheduling practices were used, such as using placeholder activities for delays and idle time rather than lead and lag.
- No policies or guidelines existed as to how to estimate and schedule personnel based on availability, productivity, or utilization.

Implementing earned value in this environment was a challenge, but the decision was made to commit to it and adjust the planning, management, and control accordingly.

3.3.1 Implementation Approach

Implementing a full EVM environment was not possible, but some significant improvements were introduced that enabled greater certainty in the management of the project and certainty that the performance reporting was reliable. For such an implementation to be successful, gaining and maintaining the support of the team was essential. The overarching principles in establishing the new management framework included these:

- Minimize any new work required by the team in implementing the new approach; the team was already stretched.
- Seek maximum value from EVM for minimal effort.
- Ensure all effort undertaken was beneficial to general planning and control activities as well as for establishing EVM.
- Clearly identify the process to be followed and the individual responsibilities for implementing the new approach.
- Build on and improve current practices rather than replace them.

- Use only customer-based activities for performance reporting, not supplier activities. Sufficient control of the supplier did not exist. The assumption was that supplier performance would be apparent through performance of customer activities.

Specific changes in practices were required:

- Separate estimates and costs of personnel from those for material, and then base monitoring and progress reporting on the personnel budgets and costs.
- Decompose long duration activities into smaller, more manageable packages where possible. Difficulty was not a reason against doing so; pragmatism was.
- Link activities and milestones to long-term or LOE activities to achieve improved performance reporting.
- Use milestones to track delivery and/or payment of major purchases, and link activities associated with these milestones to these milestones.
- Align work breakdown structure with the schedule. Place cost and duration estimates at the work package level.
- Capture costs at the subproject level (re-engineering the cost capturing process was not practical), but get clear when costs were incurred so actuals for a period could be compared to the plan.

Implementation Issues and Solutions. Some of the key issues that had to be addressed to successfully implemented EVM will now be discussed.

Funds Not Allocated Below Subproject Level. Large sums of money had been allocated to whole subprojects without the money being allocated to any lower level activities. One particular subproject was responsible for network nodes, and funds had been allocated to the project for all the work in its scope.

Following are some of the problems faced with allocating costs:

- The number of existing nodes to be upgraded (approximately 600) were easily identifiable, but an unknown number of new nodes would also be required. All of these were covered by the budget.
- Of the existing nodes, about nine categories required different effort, activities, and therefore costs.
- About six significant activities had to be performed per node, some of which were clear cut in terms of effort, but others were susceptible to risk events from external stakeholders. These activities had already been scheduled and were being tracked. It was the allocation of costs and the ability to relate cost to schedule that was missing.
- Integration work was required for every group of approximately 10 nodes that also needed representing in cost estimates and allocations.

Effort was spent estimating cost and duration for the collection of nodes and the integration activities that had to be performed:

- Determine the relative levels of effort required for a node across each of the discrete activities.
- Determine the level of exposure to threats from external stakeholders, based on historical data and experience of the team, and therefore what level of contingency was required across this particular subproject. The contingency was removed from the allocation process.
- Determine the time required for integration activities relative to the other types of activities that had to be performed.
- Estimate the likely number of new nodes.

Based on the analysis, cost estimates were identified for all nodes and their discrete activities and integration activities. Undistributed budget was set aside for the potential nodes.

A baseline was then established that identified the activities against nodes that were required to any given point in time and the funding required for those activities. This enabled relatively easy calculation of planned value (PV) and earned value (EV) through the activities of the project, which could be compared with actual cost being captured at the subproject level, except for the issue of managing long-term activities, to be discussed next.

Long-duration Activities. It was never going to be possible to get the project decomposed to the ideal work package size, where estimating could be performed for discrete activities and to which best practice management and control practices could be applied. While it was recognized the project would always have a number of spanning level of effort activities, the percentage of such activities in this project was going to be higher than desired, even after performing more detailed planning work. A solution was required to ensure that "big" activities and the intrinsic difficulties of estimating percentage of work complete did not negatively offset any value created from all the planning work that was being carried out.

Three categories of activity were defined and used throughout the project:

- **Normal:** Activities that could be discretely identified and scheduled, and have resource and budget assigned were refined to approximately 100 hours of effort.
- **LOE:** Activities related to support, administration, and management type functions with no discrete activity, and the person was assigned for a specific percentage of time for the duration of the activity.
- **Exception:** Large timeframe activities (more than one month, but could be significantly longer) that could not be decomposed into smaller tasks. These generally related to managing/supporting vendor activity.

Planned Value (PV) calculations were based on the following formula:

$$PV_{\text{Task}} = BAC_{\text{task}} \times \%(\text{Planned for Completion})$$

Costs for level of effort and exception activities were prorated over the full duration in monthly increments.

EV calculations for these activity types were more interesting:

- **Normal** Earned Value was calculated using the 50/50 rule; therefore,
  - Not started: EV = 0
  - Started: EV = BAC × 50%
  - Finished: EV = BAC

  This approach simplified the administrative efforts of the schedulers, not requiring percent complete calculations, and was a reasonable approach since the activities covered by this had been made of a consistent size in terms of the effort they involved.

- **LOE** There was no easy answer. While a general approach was developed that did allow a reasonable approach for estimating earned value, they were often susceptible to threats (such as drawn out consents process when seeking local government approvals). A vanilla approach was applied:

  1. Identify all activities, milestones, and other LOE activities that a specific LOE task supports.
  2. If the LOE supports progress milestones that pertain to percentage complete of vendor activities, these will be used as the measure of PV.

$$PV_{\text{LOE Task}} = BAC_{\text{LOE Task}} \times \%(\text{Completion of Vendor Activities})$$

  This was recognized as not being the most accurate method for calculating EV, but it would provide reasonable results for the effort required.

3. If the LOE activity supported other tasks, these were identified and their collective schedule performance index (SPI) was used to calculate EV of the LOE task, using this equation:

$$EV_{\text{LOE Task}} = PV_{\text{LOE Task}} \times SPI_{\text{Supported Tasks}}$$

Obviously, the EV calculations for supported activities had to be determined before that of the LOE activity, including any subordinate LOE activities.

Figure 3.1 shows a project that is halfway through its schedule. A common mistake is to report EV of the project management task as being 50 percent of the full amount since the time is 50 percent through. However, if the project is late, the project management task will continue. Similarly, if the project is early, the project management task will finish early. It is therefore more accurate to calculate the earned value for the LOE activity based on the performance of the activities that it supports. In this example, the SPI of the project, without the LOE task, was 0.875. The EV of the LOE task was therefore SPI $\times$ PV = 0.875 $\times$ \$100,000 = \$87,500.

Figure 3.2 highlights that regular tasks are processed first, and then LOE activities that support those tasks. Finally higher level LOE activities that support the other LOEs are processed, using EV information, particularly the SPI results.

Unlike LOE activities, no activities were below exception activities. Since exception activities represented support of vendor activities, performance milestones were established against which progress could be measured. Each milestone had completion weightings assigned before baselining was carried out. When a milestone was achieved, its value was earned by the project.

Actual Cost (AC) was determined against the financial accounting buckets that were already being used at the subproject level. Effort was put into ensuring that costs were legitimately part of the project against which they were recorded. Overhauling the cost accounting of the project was considered too significant an undertaking to take below the level already required by senior management to provide performance reporting.

Adjustments to Scheduling Practices. It was also necessary to adjust the process for scheduling within the project to ensure that the team could focus energy on the significant undertakings associated with earned value and concurrently move the project forward. The following guidelines were applied to planning, particularly related to schedules:

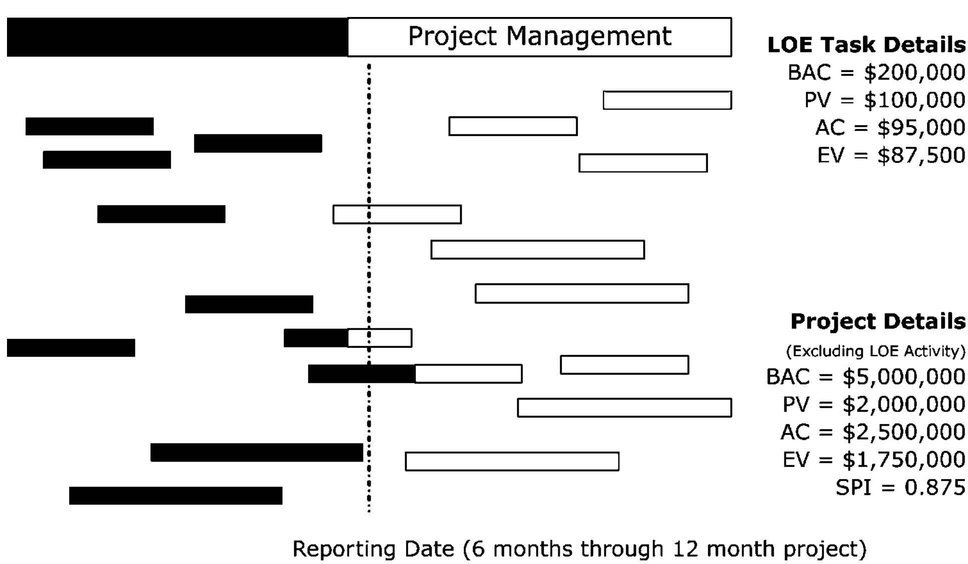

FIGURE 3.1 EV calculation for level of effort activities.

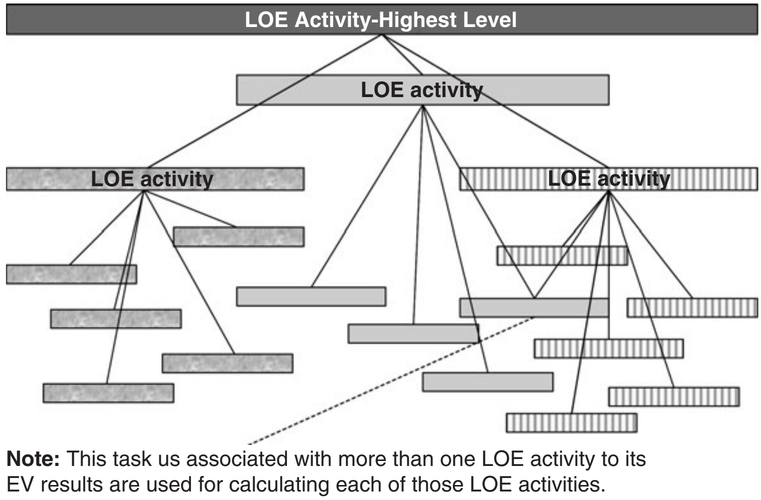

FIGURE 3.2 Processing level of effort activities.

- **Rolling wave planning** Schedules were developed with a minimum three-month detailed planning window. Ideally, detail planning would be further out, but this enabled attention to focus where it was needed most.
- **Resourcing** Those who would be performing the work were identified against all activities. This might have been at a skill level initially and then adjusted to specific names as they could be identified. This facilitated communications with business as usual (BAU) and made it easier to track resources.
- **Budget distribution** Total budget for each phase was shown in the summary activities. As the detailed planning was performed, the budget was distributed across the detailed work packages.
- **Baseline** In conjunction with the detailed planning window, the baseline for detailed tasks was established before the three-month window was entered. The activities were frozen in terms of schedule and budget and any change managed through change control.
- **Materials costs** Costs not specifically related to work were not included in the work packages. The aim was to separate costs such as software licenses, purchase of hardware, and so on, that were major deliverable milestones that represented points at which costs were incurred to the project, thereby keeping activity costs related to performance.

These were not ideal approaches to planning, or monitoring and control, but they were a pragmatic compromise to ensure the team did not lose its focus on the project and was also able to manage the project using better practices.

Results of Implementation. Considerable effort was required to implement earned value into the existing and operational project. However, the team bought into and committed to the exercise. Some of the key benefits the team was able to recognize included these:

- Improved risk management, with increased detailed planning, which meant that risk was better understood. For example, documenting activities reduced the exposure related to key personnel with crucial knowledge becoming unexpectedly unavailable.
- Greater confidence that the progress being reported to management was accurate and that they could in fact recognize, diagnose, and address performance problems.
- Having a sound basis for communicating with stakeholders about project progress and areas that needed special mention (good news) or attention (potential problems).

- Greater consistency in how the project was planned, managed, and monitored across the project.
- Decreased volatility in the project environment because practices forced commitment to planning and control. That was a benefit to both the customer and supplier. It forced some decisions to be made rather than be left to the last moment.

3.4 STAKEHOLDER MANAGEMENT

Since the early 1990s, awareness of the importance of people to the success of a project has gained importance in the realm of project management. The 1996 edition of the *PMBOK Guide (A Guide to The Project Management Body of Knowledge)* mentions stakeholders and the importance of managing them. It is only with the 2004 edition that the management of stakeholders became a subprocess within the knowledge areas. This advancement of stakeholder management is an indication that project management is indeed growing up, maturing, and becoming more conscious as a disciplined profession.

Wade (1996) identifies that in maturing and developing as individuals, we shift from conformist consciousness (a level at which we spend much of our lives) into achievement or affiliative consciousness, collectively called *competency consciousness*. Western men tend toward achievement consciousness. Western women and Eastern men and women tend toward affiliative consciousness. Here's the difference between the two:

- **Achievement consciousness** Focus and attention placed on how to be successful and thrive in creating results.
- **Affiliative consciousness** Focus and attention placed on relationships and the power and benefit that can be gained from effectively engaging with others.

Both of these forms of consciousness that make up competency consciousness must necessarily be established and enacted in our lives for the next level of consciousness, *authentic consciousness*, to become part of our awareness and therefore accessible. Men tend to start with achievement consciousness and grow and expand their awareness and skills towards affiliative consciousness, and the reverse is true for those with a propensity toward affiliative consciousness.

Project management took hold in the 1950s as a male-dominated discipline focused on achievement. Now it is developing awareness (consciousness) that well-managed relationships feature significantly in creating success. Such relationships, however, are still approached from an achievement-driven perspective—processes, procedures, and control mechanisms to assure an unnatural (from an achievement-driven perspective) approach can be applied and managed.

Stakeholder management from the achievement consciousness side recognizes that relationships are important, and project managers must be open to the confusion, chaos, and lack of predictability they may involve.

Effective stakeholder management will do the following:

- Identify all groups and individuals that may be of influence or be influenced by the project.
- Determine the level of influence each stakeholder may have on the project.
- Appreciate the level of impact the project may exert on the stakeholders.
- Form relationships with stakeholders that facilitate positive project outcomes.
- Identify and monitor relationships for triggers related to risks associated with stakeholders.
- Focus activities for managing stakeholders that conserve project resources and satisfy stakeholder needs.
- Understand, respond to, and realign the various expectations of stakeholders.
- Increase confidence, reduce stress, and lighten workload for the project manager, because this person knows that the needs of the stakeholders have been identified and are being consciously managed.

3.4.1 Implementation Approach

In establishing a stakeholder management process, the following stages are important.

Stakeholder Identification. Determine the individuals and groups that make up the parties with distinct interests and functions related to the project. The following categories of stakeholder interaction with the project can be useful in identifying and then subsequently planning management activities. A particular group may belong to one or more of the categories. A group or individual is specifically identified when they have a unique feature regarding their interaction with the project.

- **Participants** Those who are directly involved in performing work under the direction of the project manager require information about the work to perform, activity completion criteria, and how and when to obtain sign off. Examples include the vendor's project team, full-time and part-time project team members, and BAU participants who work on specific tasks.
- **Business relationships** Nonparticipants who enhance the capabilities of the project and whose own business activities may be affected by the project. Examples include business partners and suppliers, particularly if their sales will be impacted by the relative success of the project. This will often involve groups within the supplier who are different from those who are participants.
- **Deliverable recipients** Nonparticipants who receive a product or deliverable from the project. Examples include BAU personnel who will assume responsibility for the ongoing operational management and maintenance of the project products (technical support, sales and marketing, for example), and other projects dependent on yours to provide a specific output.
- **Deliverable providers** Nonparticipants who provide a product or deliverable that is used within the project. Examples include BAU personnel who provide inputs to the project (such as sales and marketing plans), and any project that must deliver a specific output required by the project.
- **Information recipients** Those who expect and/or require information from the project, for which the information is not related to some other category. Examples include project review boards (for status reports and so on), vendor's management personnel, organization staff (such as a number of different groups covering different types of informational needs within your own organization), and project managers of interacting projects.
- **Information providers** Nonparticipants from whom the project requires specific information. Examples include supplier product and technical updates, senior management (for strategic direction, business decisions), project managers of interacting projects, and external consultants or internal groups that need to be consulted for specific information.
- **Authorizing parties** Any individual/group responsible for signing off, authorizing, and/or accepting work or products of the project, and who control resources required by the project. Examples include anyone involved with authorizing new work or making changes in project direction; BAU managers who accepts deliverables for operational responsibility; contract signatories for owning organization and vendors; personnel responsible for authorizing access to facilities; regulatory authorities that issue licenses, consents, and so on; property owners that may be impacted by the project; and anyone who controls budget to which the project needs access.
- **Decision-makers** Any individual/group that makes decisions that impact the project. These are typically information recipients, whether they are aware of this or not. Examples include senior management and other project managers.
- **Influencer** Anyone who has specific influence and can be a potential source of managing the needs, views, and expectations of others. These people may not have any authority or decision-making capacity, but they are revered by those who listen to them.
- **Affected Parties** Those who are not otherwise involved or directly interacting with the project, but who may be affected by it, including the general public, who are potential purchasers of project outputs, and anyone who is directly affected positively or negatively by the project.
- **Threatened parties** Those who are facing a potential threat, real or perceived, from the existence and activities of the project. They may be in any of the proceeding categories. Examples

include competitors, business units/managers who feel their power base may be eroded/removed, and employees who face or fear retrenchment.

- **Volunteers** Those who have a motivated interest in participating in the project without compensation or job recognition. They often have specific outcomes they want realised through the project. Though not often used in the commercial sector, this category can be applied beneficially in the not-for-profit sector. It is important to recognise that managing a team of volunteers is very different from a remunerated team.

Each category of stakeholder has different needs, requirements, involvement, awareness of the project, and interest in participating with and supporting the objectives of the project. Where possible, gather the following as a minimum for each:

- Names
- Background
- Mission
- Special circumstances
- Past experiences with them

Use the project sponsor, team members, functional managers, and others to assist in identifying potential stakeholders. A stakeholder may fit in multiple categories, and depending on the size of the project, the categories may vary according to areas of project activity. For a significant undertaking, stakeholders may be interested only in select portions of the project. It is then important to be clear about their interests and focus on those portions. It may be important to perform stakeholder categorization down to subsets of the project. For example, one stakeholder may be interested only in marketing functions of the project. Another stakeholder may have interest in marketing and differing interest (categories) in product development.

Stakeholder Interviews. Identify the key stakeholders and conduct interviews to identify and understand stakeholders' issues, concerns, and expectations. In some environments, focus groups and other techniques may be useful. The following sets of questions are an example of the information that is useful to glean from stakeholders during interviews.

To assess the broad understanding of the stakeholder, ask the following questions:

- What is your understanding of the project objectives?
- What do you understand to be the major deliverables and outcomes?
- What major threats and roadblocks exist for this project?
- What major opportunities do you see for the project?
- Do you have any direct involvement in the project? (Examples include performing work; providing authorizations, sign-offs, personnel, resources; or accepting outputs.)

To assess the impact of the stakeholder, ask the following questions:

- Given your understanding of the project, which, if any, of your activities have an impact on the project? Describe the impact.
- In making decisions that potentially affect or impact the project, do you consider that impact?
- If so, what steps do you take to better understand the impact you may have on the project?
- If not, does it matter to you that actions you take may impact the project positively and/or negatively?
- What information would you require to enable appropriate impact assessments to be made?

To assess the team influence, ask the following questions:

- In what ways do you believe the project may impact you?
- What information do you need and in what time frame/frequency would it be beneficial for you to receive it?

- What could the project team do better to support your specific needs as they pertain to the project?
- What are your pressing issues, concerns, and constraints related to the project?
- Will you work or interact with other stakeholders?
- Would there be an effective manner whereby all your collective needs could be supported?

Stakeholder Assessment. Capture all stakeholders in a *stakeholder matrix,* which has *Stakeholders* in rows and *Stakeholder Categories* across the top. Mark each cell that identifies a category to which a stakeholder belongs. In addition to contact information, capture the following information for each stakeholder individual or group:

- **Background** Background, mission, special circumstances, and previous experience with them
- **Relationship** Their involvement with the project; support they require from the project team; their project-related concerns, issues, constraints; other project stakeholders they influence.
- **Assessment** Potential impact they can exert on the project, interest or motivation they have in impacting the project, potential influence the team has on them.

The *Impact scale*, shown in the following table, measures the stakeholder's ability to make a positive or negative difference on project objectives. High negatives will be actively working against the project. High positives are wonderful allies. In either case, it is important to recognize who they are and ensure they are appropriately managed for optimal outcomes.

Label	Value	Criteria
Very Low	1	Negligible discernible impact or other influence.
Low	2	Minor to moderate change to the approach of a subproject, its deliverables, costs, or schedule. Requiring management action at subproject manager level or higher. They possess influence over other subproject-level stakeholders and may influence them regarding the project area of involvement.
Medium	3	Minor change to the approach of a project or moderate to significant change of approach for a subproject, its deliverables, costs, or schedule. Requiring management action at subproject manager level or above. They possess influence over other project-level stakeholders and may influence them regarding the project area of involvement.
High	4	Moderate change to project approach, its deliverables, costs, or schedule. Requiring non-urgent intervention by the project manager or from senior management. They possess significant influence over other stakeholders and may influence them regarding the project.
Critical	5	Significant change of project approach, its deliverables, costs, or schedule. Requiring intervention by the project manager or from senior management. They possess significant influence over other stakeholders and they are strongly influencing them regarding the project.

Impact can have negative or positive values to denote the type of impact likely to be exerted by the stakeholder.

The *Interest scale* measures the level of motivation of the stakeholder to exert their power to impact the project, regardless of whether the impact sought is positive or negative to the project. The criteria for interest can be established in a similar fashion to impact or influence.

Stakeholder Potency is a measure of the power of the stakeholder to impact the project, a measure of capability and motivation to do so:

$$\text{Potency} = \text{Impact} \times \text{Interest}$$

The *Team Influence* scale focuses on capacity of the project team to work with stakeholders to do the following:

- Positively shift their attitude and level of support
- Interface and work with them to understand and satisfy their issues and concerns
- Satisfy their needs, issues, concerns, and expectations

Use the descriptions to identify the level of influence available through the stakeholder. The descriptions are designed to guide the assessment. High levels imply potentially high influence for minimum investment, while the low values suggest little opportunity for influence or will require higher investment for an outcome. Prioritize the stakeholders based on the three areas of specific assessment identified in the following table.

Label	Value	Criteria
Very Low	1	No discernible influence identifiable. Practically no capacity for contact or feedback. No mechanism available for shifting attitudes and perceptions.
Low	2	Attitudes can be shifted slightly toward being more positive. Opportunity exists to elicit understanding of needs and concerns but not through personal contact. May be able to meet a few of their needs, but the majority of needs, expectations, and concerns cannot be addressed.
Medium	3	Attitudes may be improved with reasonable effort. Opportunity exists for some personal contact. It is possible to meet some of their needs.
High	4	Can positively influence their attitudes and willingness to support the project with reasonable effort. Personal contact is available. It is possible to identify and meet their major concerns and needs as part of the process of delivering the project.
Very High	5	Can turn them around to totally supportive. Opportunity exists for open, direct communications and close personal working relationship. Have the capacity to satisfy their expectations, needs, and concerns completely without significant investment.

The overall rating of the stakeholder may be calculated like so:

$$\text{Rating} = \text{Impact} \times \text{Interest} \times \text{Team Influence}$$

Figure 3.3 shows the Stakeholder rating chart.

Stakeholder Management Strategy Development. In developing strategies that address the interests of stakeholders across the project, consider the following:

- Who should interact with the stakeholder?
- When is the best time? Frequency of contact?
- What are their preferred communication channels? Phone? E-mail? Video conference? Newsletter? Other?
- What is their known position regarding the project?
- What is the stakeholder's likely hidden agenda?
- What influences could be exerted on them?
- What approaches are most appropriate to use?

Four types of strategy can be applied to stakeholders:

- **Active outreach** Sending information or taking action aimed at positively drawing their interests toward the project
- **Passive outreach** Using mechanisms to convey information that are dependent on the stakeholder taking initial steps to find it

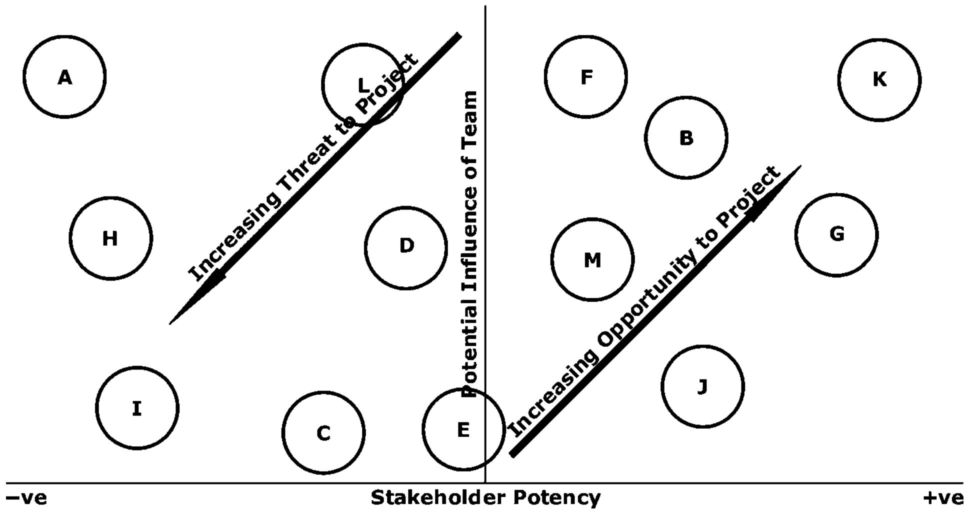

FIGURE 3.3 Stakeholder rating chart identifies stakeholder potency relative to each other, against the team's ability to influence. If Interest is not assessed, assume a value of 1.

- **Active involvement** Actively drawing the stakeholder into an active project interface
- **Passive involvement** Providing opportunities for involvement in the project processes in a form that must be initiated by the stakeholder

Examples of each of these strategies are as follows: Active outreach could be made via interviews, newsletters focused on stakeholder interests, personal contact, relationship development, road shows, social functions, and surveys. Active involvement could include chatroom groups, handover/transition plans, invitations to join a committee, involvement (pending activity) lists, relationship facilitation between stakeholders, review and feedback, and steering meetings. Passive outreach could involve intranet or Web pages with details of the project or distribution of newsletters. Passive involvement could include distribution of orientation materials, policy/procedure manuals, responsibility assignment matrix, and status reports.

Define the strategies against project areas for stakeholders and/or categories of stakeholder. These would be presented in the project communications plan. Note that the plan should cover two-way flows of information—what the team must send out and what the team expects to receive.

Stakeholder Monitoring. Having developed, established, and implemented the stakeholder management plan, it is vital that the following occur:

- Monitor that the team is implementing actions related to the management plan.
- Evaluate the efficacy of strategies.
- Update the plan to reflect changing information, project conditions, and stakeholder attitudes and behaviors, and to improve the efficacy of strategies.

3.5 RESULTS OF IMPLEMENTATION

By implementing an effective stakeholder management process, a number of positive and direct outcomes can be realized:

- Clarity about the messages to be sent to stakeholders, the timing, purpose, and form (that is, a sound communications plan).

- Creatively identifying approaches to address and meet the needs, concerns, and informational requirements of stakeholders.
- Elevation of relationships from simply being a practical approach that supports success to connections that are positive and contributory, where those involved feel genuinely valued.
- Increased support from the stakeholder community.
- Easier acceptance of the project deliverables.
- Improved willingness to work through and resolve conflict in a collaborative manner.

3.6 CONCLUSION

Whether performed in New Zealand or elsewhere, good project management is the same. Projects require effective management to be successful. Earned value management and stakeholder management at least in part address the triple constraint and the people element of projects. The project manager can have a greater confidence in his or her management approach with both in place.

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CHAPTER 4

AN EVALUATION OF MAJOR INFRASTRUCTURE PROJECTS IN FRANCE: A "PROJECT FINANCE" PERSPECTIVE

Professor Christophe N. Bredillet

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ABSTRACT

The purpose of this chapter is to present the French specificity in founding *major infrastructure projects*. After setting up the project finance scene, the chapter provides a tentative definition of *project finance*, showing the multiple facets of the concept to point out three main forms based on cash-flow profiles. Two different approaches are compared: "Anglo-Saxon" versus "French." The chapter concludes with an overview of the different legal techniques for public-private partnership in France.

4.1 SETTING UP THE PROJECT FINANCE SCENE

Project Management Institute estimates that the world spends nearly U.S. $10 trillion of the world's $40.7 trillion gross product on projects of all kinds (PMI, 2001). Each year, more than U.S. $150 billion is invested worldwide by banks and other lenders or by capital markets in many projects financed by the so-called "project finance" method. This method consists in financing assets with the cash flows generated by the project, without (or with limited) recourse to the shareholders, rather than financing the project according to the quality of the credit rating or the securities brought by the shareholders of the company that carries out the project. In 1994, project finance equaled hardly $30 billion, but for a few years, this figure has clearly been rising, despite a decrease noticed in 2001 and 2002 due to a crisis in capital markets.

This method not only attracts more and more significant capital but has also spread across the globe, where it is used in a wide range of activities. In addition, it requires the use of sophisticated financial tools in strongly rising capital markets. The emergence of that phenomenon can be felt intensely in the United Kingdom. In 1992, the Chancellor of the Exchequer (a minister of the British cabinet) launched the Project Finance Initiative (PFI). This new technique for allocating work and management of public utilities substitutes for traditional operational management. British authorities explain the use of PFI by the fact that it noticeably lowers costs. Elaborations spun off PFI are currently being developed throughout the world, and especially in Europe (Portugal, Spain, Italy).

Project finance development has been possible thanks in part to the tremendous revolution in communications. Only a few decades ago, it would have been impossible to carry out such complex operations, so far from the headquarters of the multinationals or groups of companies that develop them. The increase of the frequency of flights as well as the decrease of traveling costs, and the emergence of technology of communication (broadband Internet, e-mail, conference call, Visio conference) make it possible to gather information from experts throughout the world at any moment. Operations can thus be completed in a relatively short time, which is consistent with the consideration of risks linked to the variations of interest and exchange rates. The increase of capital market dynamics and penetration—mainly obtained through the improvements of electronics—enables risks to be shared out in a better way, thanks to a larger number of participants.

Despite these significant developments, project finance is little studied in the academic world of finance, and financial literature on the subject is almost nonexistent. As strange as it may seem, only a few pages are devoted to project finance in most financial textbooks. Some general articles have been written, but they are few considering the interest and actual use of this method. Neither is the stack of theoretical literature thick: of only a few general publications, those dealing with theoretical issues can be counted on the fingers of one hand. This is due to the fact that such projects have two common features: a high level of complexity and extreme confidentiality.

Major infrastructure projects are extremely complex. They include a large panel comprising very different skills and a wide collection of disciplines: engineering science (conception, construction, design), human resources (for achieving and operating projects that are often huge), and legal structures that sometime require several dozen simultaneous contracts written in the frame of different local rights and in very contrasted legal environments (spun off Anglo-Saxon right or Napoleonian Civil code). A large number of financial techniques (syndicated loan, bond issue, exchange or interest rates swaps) are also mobilized, with different accounting and taxing modes, varying from one country to another.

Furthermore, skills in evaluation of revenues are essential (transportation studies, market research for selling energy products, and so on). In addition, these elaborations are systematically tailor-made, even if we can group them according to different methods that appeared at the same time or successively. All of these activities imply multilateral and multicultural negotiations between partners that have different interests. Therefore, project finance is standing in the middle of the combination of multiple disciplines, and this is what makes it so interesting—but also so complex.

It would be difficult for a researcher to get into the world of project finance to obtain a pertinent knowledge in that specific field. Confidentiality is one of the basic principles of these international requests for proposals. That confidentiality is all the more significant with regard to the financial stakes, because loss of a project can come at a high price: the cost for handing in a bid can reach or even exceed U.S. $1 million.

For these reasons, little can be found for an in-depth study of this domain. It is even difficult to find databases that provide a precise idea of a specific field of activity.

4.2 COMPLEXITY OF PROJECT FINANCE

Project finance is not an easy concept to define. It is a modern and sophisticated way of recreating a very old method for financing a project. The great maritime voyages, such as those involving the discovery and the exploration of the Americas, for example, were financed with private capital using the same project finance methods used today. Limited partnerships were often used. These organization gather limited partners, for whom risk is limited to the invested capital, and active partners who do not invest (or who invest small amounts) but run the company and are liable for its deficits on their entire patrimony.

Project finance is of primary importance. Understanding project finance requires a multidisciplinary approach that covers a multitude of elaborations, in many sectors, and in different environments. The link between these various solutions, project finance, and public-private partnership (PPP), is not always easy to determine.

In the 1970s, project finance was used for electric cogeneration, whose elaboration is quite simple. Then, after about 10 years of eclipse due to difficulty encountered by financial markets in the area of syndicated loan, it reappeared in the 1980s for financing large oil fields (especially in the North Sea). From the 1990s on, lenders have had a renewed interest in financing major infrastructure projects.

As mentioned in the introduction, project finance has grown in importance in the financial world. It was first a private propriety of banks, but it has now begun to open to bond markets and accounts for about 20 percent of loans. This financing technique is applied to numerous domains:

- The industrial sector, with electrical cogeneration plants. Private industrial investors are most interested in these operations.
- The prospecting and exploitation of natural resources (oil, natural gas, mines, etc.).
- The infrastructure operation (electronic communications, bridges, highways, pipelines, water distribution, etc.).

The most concerned spheres of activity are energy, telecommunications, and rail and road infrastructures. Activity distribution changes with time and with political or economic events.

Project finance is used in industrial countries as well as in many developing countries on every continent. The World Bank is an enthusiastic promoter, because this method can be used to create a partnership association between private and public sectors. Once again, global economic and political evolutions have an impact on its geographical distribution. Its use is widespread throughout the American continent, while the Asia-Pacific area, the Middle East, and in Africa use of large infrastructure project finance is on the decline. After a steady decrease for several years, the interest in European projects is on the increase since the year 2000.

4.2.1 Multiple Definitions of Project Finance

Different authors have tried to define project finance. Surprisingly, their definitions are sometimes rather contradictory. They more often attempt to explain what project finance is not. For example, the basic concept of "concession" does not have the same meaning from one author to the other. Vagueness and contradictions are probably due to the variety of operations covered by the same word, when the projects are all different in their natures, in the incurred risks, in their sizes, and in the targeted sectors. The first task to undertake to understand those elaborations is to define them.

In France, project finance can be confused with financing a "concession" or more commonly the "delegation of a public utility." Yet those contractual frames based on a "French-style public utility" are only some cases of project finance among others. In some other countries, project finance can apply to fully private goods.

Size of the Operations. Some people think that project finances are elaborated for medium-sized operations with controlled risks. They take the example of electric cogeneration—in which a chemical or petrochemical industry transforms its by-products into vapor. That vapor is reused in the plant, and surplus is used to produce electricity that can be sold to a power provider. In project finance, that non-strategic activity is different from the primary activity and is transferred to an *ad hoc* firm.

For others, project finance is used for very large projects with high risks. But some also bring both together so that the techniques used for financing a pipeline, for example, can help finance a cannery, a hotel, a ship, or a production plant. However, even smaller scale projects require relatively significant investments. Consultant expenses for risk analysis and supervision or legal expenses for ensuring contractual patterns elaboration and validity imply high costs of development. These expenses can only be amortized on certain scale projects. The minimum possible amount for such an operation is in the tens of millions of dollars. The minimum investment for infrastructure projects can be more than U.S. $100 million, except if it is possible to amortize the expenses on different similar projects, but this is unusual.

Limited Recourse. Project finance is fundamentally different from corporate financing. In direct corporate financing, lenders consider that all the assets generate the cash flows needed to pay back loans. Project finance encompasses a large scope of elaborations whose common characteristic include that their financing does not rely mainly on sponsor loans or on the value of the concerned assets.

One of the project finance fundamentals comes from the possibility of isolating the financed asset from the promoter's other assets in a legally independent entity. This is the case with a manufacturing plant, a highway, a power plant, a telecommunication infrastructure, or for the development of an oil field. That specific entity—the special purpose vehicle (SPV)—is a legal structure (a public company or a joint venture, for example) that has been created for a limited period of time and that has a capacity to raise loans. Sponsors are reimbursed by project-generated cash flows. In other words, they assume the risk of receipts.

Theoretically, there should be no recourse against promoters of a project if it is not as profitable as expected. In practice, however, there is nearly always possibility of recourse against the sponsors of the project, but this right is limited.

One advantage of this method is that it often enables a private company not to show the incurred debt in the balance sheet of the operation promoting company and to deconsolidate that debt. In some cases, for example, states do not have to record the corresponding debt in their overall debt. Some people see this absence of consolidation as the sole reason for project finance. But very few project financings elaborated on company-owned assets can escape a mention in their balance sheet. However, project finance allows a much better leverage in the SPV than in the parent company: "Project finance is a financing with limited recourse that concerns an isolated project, in a special purpose vehicle with limited life cycle" (Lyonnet du Moutier, 2006). Those conditions are necessary but not sufficient. A large number of project examples with the same characteristics cannot be regarded as project finance.

A Significant Risk in Construction and Exploitation. Project finance has nothing to do with leasing. Consider the example of ship buying for which a long-term leasing agreement has been concluded. A bank can grant a financing solution without impacting the project-generated cash flows. This is a case of limited recourse asset finance, of which leasing is a special case.

Often ignored is that one of the main characteristics of project finance is the necessary existence of a significant risk on project completion and of a risk on the economic value of the financed assets.

The project finance process can be divided into three stages:

- Financing of project work.
- Project completion. It must be completed on time, within the allocated budget, and in accordance with the imposed specifications, so that it can produce the expected cash flows to pay back the loans.
- Debt servicing. Debt is paid through the operation of the financed assets, with limited recourse to shareholders in case of default.

The necessity of a significant risk on project completion should not confuse project finance with a financing solution in which the concessionary bears the risk during the construction loan. Even if that opportunity is used, project finance covers other risks, and the operating risk in particular.

A Community of Interest. The objective of a project finance set-up is to replace the classical recourse to promoters/developers by third-parties commitments or guaranties. The methods used in project finance are relatively more flexible than methods used when taking direct securities on sponsors' credit.

Project finance enables risks to be shared among several parties. The range of technical, economic, environmental, and accrual risks is such that it would not be wise for a single party to bear the risk alone. Of course, sharing risks is interesting for some powerful promoters who have economic interests in the projects and can transfer some risks to a third party. For example, some large construction groups are able to sign turnkey contracts for a fixed price and a fixed date, and they bear the potential damages—high liquidation damages in case of delay of delivery. On the other hand, with project finance, these groups can transfer some risks that are not part of their scope of authority (such as transport and receipts) to banks or financial institutions. In the same way, they can transfer operation risks to specializing companies. Banks and institutional investors prefer this transfer, despite its complexity, because it makes it possible for them to have comfortable margins with a relatively well-determined risk.

Significant Financial Leverage. Project finance represents a community of interest among a group of independent entities. Those operations are often financed with high debt proportion. However, this is not always the case. The proportion of equity capital in natural resources prospecting and exploitation operations can be very high, for example. In addition, some long-term research and development operations are financed for a large part with equity capital. In that case, project finance and venture capital should not be confused. Venture capital enables development operations to finance the development of technology in a strong market with an equity capital brought by investors looking for a high and fast return on their investments.

Project finance is a form of structured finance. In a bank organization chart, the project finance team is often placed parallel to the manager in charge of implementing structured finance, such as assets-based finance, leasing, real estate, and so on.

Lyonnet du Moutier (2006) define project finance as follows:

> Project finance is an elaboration set up for projects presenting significant risks regarding their completion, and the economic value resulting from their operation, and for which it is possible to find industrial participants sponsors, etc., who have a strong community of interest in having the project succeed.
>
> That elaboration makes it possible to finance the operation of an asset, the development of a natural resource, a right or a service; generally with a large proportion of indebtedness, in a legal entity that is distinct from the promoter(s) of the operation. Loans and invested funds repayment quasi-exclusively comes from the cash flows generated by the project, with a limited recourse to its promoter(s).

4.3 PROJECT FINANCE CATEGORIZATIONS

Two possible categorizations are used with project finance: categorization based on the cash flow profile and categorization based on legal and contractual structure.

4.3.1 Categorization Based on the Cash Flow Profile

Project finance has developed on three main axes that can be characterized according to the cash flow profile they produce and to their legal and contractual structure. A classical view of investment life cycle and cash flows is shown Figure 4.1 for three different types of projects: industrial projects, natural resources exploitation projects, and infrastructure projects.

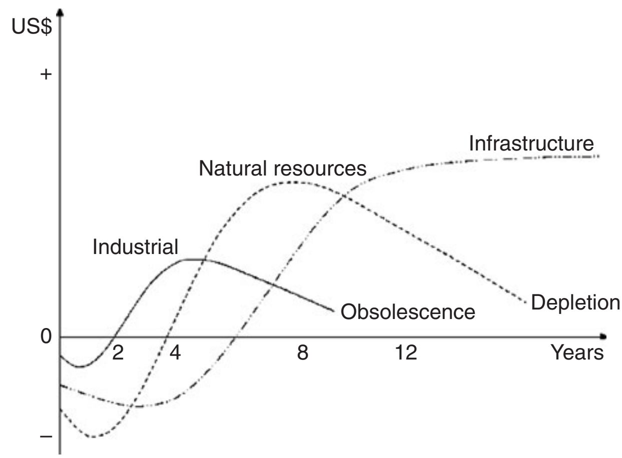

FIGURE 4.1 Comparison of cash flow profiles for three different types of projects.

The profiles of the life cycle curves are different from one type to an other. An industrial project—a power plant whose electrical production is sold in the market, for example—requires significant investments at the beginning of the operation. As technology can rapidly become obsolete, high positive cash flows must be produced quickly. A project for natural resource exploitation, such as mining oil, gas, or ores, are also characterized by high investments for a long period of time, during which the operator prospects and then develops the site before beginning operations. The final operations step can be implemented for a long time but is threatened by resource depletion.

On the other hand, a main characteristic of infrastructures is their permanence. The most dramatic example is the Channel tunnel. Now that it has been built, the only tasks required will be to replace a few rails from time to time or to perform large repairs to keep it in operation. These requirements will prolong the concession duration to nearly 100 years. The same is true for the first highways built in France that have exceeded their financial life cycle long ago but that are still being used. Three different cash flow profiles correspond to three different contractual realities, as you can see in Figure 4.2.

Industrial projects are developed by private investors. The project promoter defines an introduction strategy for the project, on a captive market (with a cogeneration plant, for example) or on an open market (with a merchant plant, for example). Then he selects a precise project with its own features and carries out the technical feasibility study of the operation. The promoter then chooses between a financing backed to the financial capacities of his company (corporate finance) and project finance.

Industrial project	Strategy set up	→	Choice of a project	→			Feasibility study	→	Decision-making
Exploitation of natural resources	Strategy set up	→	Choice of a project	→	**Agreement with the host government**	→	Field exploration	→	Field exploitation
PPP (BOT)	**Choice of the project**	→	**Public call for tenders**	→	**Contract negotiation**	→			Enforcement of the licensed contract

FIGURE 4.2 Three main types of project finance (Bold font indicates intervention of public sector. Normal font frame indicate interventions of private sector.).

In the case of natural resources exploitation, the first steps (strategy setup and the choice of project) are the same as in the previous case. But when there are two participants in industrial projects—the promoter and the lenders—a third step requires that the promoter negotiate a right to explore a geographic area at his own risks with the host government. In compensation, in case of success, the promoter obtains a right to mine. According to that contract, the promoter can exploit the natural resources to his own benefit. In some cases, that can happen after he has paid a royalty to the licensor. The positive cash flows generated by the project through the exploitation of the field or of the mine must be sufficiently high to cover the investment before depletion of the resources.

The influence of the third participant, a state or public authority, rises dramatically in the case of PPP models. One example is the French model, with the "delegation of a public utility," and another is the Anglo-Saxon model with the so-called BOT (Build, Operate, Transfer) elaboration that is applied in the domain of infrastructures. In this specific case, the public authority decides to invest. Then it starts a public call for tenders to allocate the concession and negotiates the licensed contract. The group of promoters chosen for elaborating the operation now sets up a concessionary. That company signs the licensed contract, the financing agreements, and the project contracts (in particular a building contract and the operating contract, if it is achieved by an entity different from the concessionary). The concessionary builds up, then operates, the licensed utility, and maintains the infrastructure used to provide the service. Most of the time, this operation opens a right for a toll in accordance with the traffic noticed through the infrastructure, either paid directly by the customer or by the state or local authority. In the latter case, the toll is called a "shadow toll." As the infrastructure is returned to the authority at the end of the concession, its duration is calculated so that the debt and its interests, as well as the invested equity capital and its dividends, can be paid back with the toll.

4.3.2 Categorization Based on Legal and Contractual Structure

When a state or a local authority wants to grant a license for a public utility, it has to define the tasks that are assigned to the concessionary. According to the level of control kept by the infrastructure or the associated utility, the licensing authority can decide to assign certain tasks to the private sector. In other words, the licensing authority must define the project's contractual structure.

In the usual practice, that structure is designated by an acronym corresponding to the tasks the licensing authority is delegating to the agent. With the BOT example, we see that the government entrusts the concessionary with the building (Build), and the operation (Operate) of the infrastructure that will permit it to carry out the utility. In return, it asks the infrastructure be returned (Transfer) to the public domain at the end of the concession time. In the BOT acronym, the "Financing" task is not mentioned but is part of the service the concessionary must provide.

British authorities are more precise in the field of highways, for example: their pattern is christened DBFO (Design, Built, Finance, and Operate); in fact, it is of the same nature as a BOT. British authorities generally ask that the project be returned to them at the end of the contractual period.

The chain of the operations made by the private participants is wide. For a highway infrastructure, the following actions can be expected: design, build or construct, rehabilitate, own, finance, lease, operate, transfer, and sell. Complete confusion reigns among these acronyms; for example, BOOT, BOT, and BOO are used interchangeably when they reflect different meanings. (See http://www.ipfa.org/about_pf.shtml.)

In Figure 4.3, elaboration types are placed in the increasing order of privatization level: the "fully public" setup is on the left and the "fully private" setup is on the right. A BOO is then a fully private structure, since the sponsor builds up the project, is its owner, and operates it without transferring to the licensor. Between the two extremes, there is room for a range of elaborations such as the BOT, BOLT, and BOOT. Further extensions of the concept are BRT or BLT (build, rent/lease and transfer) or simply BT (build and transfer immediately, but possibly subject to installment payments of the purchase price). Another approach, BTO (build, transfer and operate), has become increasingly popular in Asia and is particularly preferred by power and telecommunications authorities. It is a simpler transaction or concept than BOT and BOOT that can be implemented in a shorter

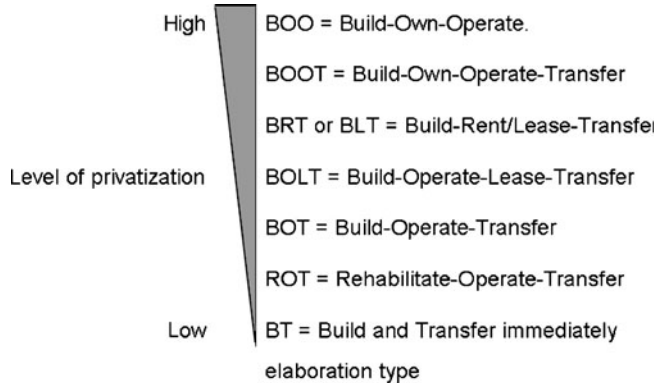

FIGURE 4.3 Level of privatization according to the project finance legal and contractual structure.

time without the need for the formation of a project company and with the project assets being owned by the public sector.

The BOT and its equivalents seem to be the used primarily for road infrastructures, because it enables the state or the local authority to remain the owner of the asset. In view of the critical aspect of road transport networks for a country's economy, it is capital. Besides, developing such a network implies land purchase and conflicts that a state can sort out quicker than the private sector. BOT makes a wider flexibility possible and enables the private sector to participate, while the strategic interests of the nation are safeguarded.

4.4 A CASE STUDY: THE EIFFEL TOWER, ONE OF THE FIRST MODERN BOT/PPP

Apart from the symbol and the technological achievement it is, the interest of the Eiffel Tower is that it is one of the first modern BOTs. Its legal and financial elaborations are similar to those used in today's project finance.

In 1889, the French Republic wished to celebrate the centenary of the French Revolution with great pomp. It had been decided to launch a world's fair that was intended to promote the French genius. Gustave Eiffel managed to persuade the minister for trade and industry, who was also the general agent of the fair, that building the highest tower in the world would prove the excellence of French industry.

A call to tender was issued on May 1, 1886. Applicants were required to reply within two weeks. Not surprisingly, the engineer-builder who had been working on the project for more than two years got the contract. The "Tripartite Convention," the concession contract defining the role of each party, was signed on January 8, 1887, between the state, the city of Paris, and Gustave Eiffel. The latter was the concessionary in his own name of the monument as well as the constructor.

As the state did not have the totality of the funds necessary to carry out an operation of 6.5 million francs of 1889 (about U.S. $15 million), it paid a grant of 1.5 million. The remainder would be paid thanks to the operation of the monument for the duration of the fair and the following 20 years. At the end of that time, the tower would be handed over to the city of Paris for destruction, which has fortunately not happened.

For mobilizing funds, Eiffel founded a stock company called the Société de la Tour Eiffel (STE). It issued two types of securities for gathering the funds. Today, their characteristics could have them assimilated to mezzanine finance products. In short, the elaboration provided for total reimbursement of the shareholders' initial stake by the operating profits. Then Eiffel would split up the profits among them by equal shares. To finance the operation, Eiffel sold half of his shares to three banks (Banque Franco-Egyptienne, Société Générale, and Crédit Industriel et Commercial). Shortly after the opening of the tower, shares were made public with substantial profits.

4.5 BOT: A TRENDY MODEL

The BOT method (Build, Operate, Transfer) is one of the most often used techniques for public authorities to grant a right to a private operator to

- build up an infrastructure,
- finance it,
- operate the public utility (or general interest activity) supported by public authority,
- reimburse the financing with the operation receipts, and
- return the infrastructure to public authorities.

That solution is in competition with the traditional way of granting public works and services contracts:

- Granting the works to a building and civil engineering company
- Financing with state/government or local authorities' budget (or with a loan incurred under their guarantee)
- Operation by state/government or local authorities

That kind of public-private partnership is made possible because, unlike industrial operations that are threatened by technological obsolescence or natural resources exploitation that are limited in time because of resource depletion, major infrastructure projects have an extremely long life cycle and can generate cash flows for much longer periods of time.

Generally speaking, this elaboration is based on a licensed contract between the public authority and a private *ad hoc* company (a SPV), giving the latter operation authority on goods or services linked to assets it does not own definitively (see Figure 4.4).

For a highway infrastructure, shareholders of the concessionary—also called sponsors or project developers—are generally the constructor(s), the operator (if it exists), and sometimes the investors. They all sign an agreement defining their inputs and their operating mode. The concessionary generally transfers the entirety of the construction risk to a construction company or to a pool of constructors, within the framework of a fixed price contract with fixed deadlines. Project operation can be subcontracted in the same way.

The concessionary is financed by means of bank loans or bonds, with limited recourse to shareholders, even if debt financing can reach 90 percent of the total investment. It is surprising to note that debt servicing is supported only by project-generated cash flows rather than by guaranty against balance sheet or mortgage loans brought by the developers. As a result, sponsors (silent partners) make sure they own the cash flows thanks to a very thorough contractual elaboration, and by taking surety on project assets.

The rights and obligations of each partner can be understood more easily by analyzing the various mandates that link the partners together. The concessionary stands in the middle of four main mandates:

- Mandate of delegated authority on the utility granted to the concessionary by the licensing authority, through a licensed contract/concession agreement
- Mandate from the sponsors granted to the concessionary and to its shareholders by means of the financial contracts and of direct agreements between the parties
- Mandate from shareholders of the concessionary given to its managers, who are generally appointed by the building/construction or operating shareholders
- Mandate from the concessionary to the constructor (or possibly to the operator) by a subcontracting contract

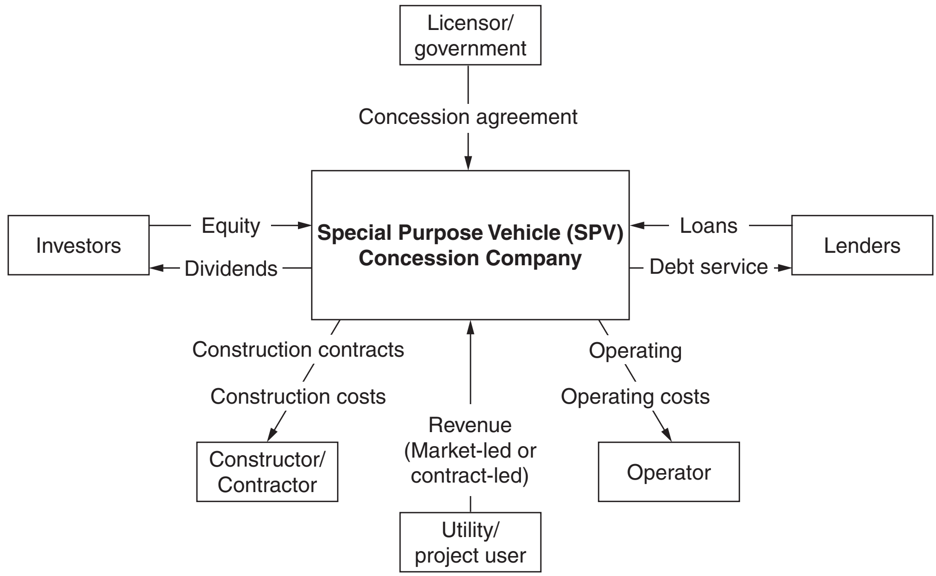

FIGURE 4.4 BOT contractual relationships.

4.6 TWO DIFFERENT APPROACHES: FRENCH AND ANGLO-SAXON MODELS

Two different conceptions of utility delegation are opposing: the so-called "French concession" and the Anglo-Saxon model that can be illustrated by the PFI launched in 1992 in Great Britain. The French model is several hundred years old. It appeared in the Middle Ages and was commonly used under the *Ancien Régime*. At the beginning, that model was administratively highly centralized, but it has been modified through the years, thanks to the constant evolution of administrative law. That model is characterized by a strong implication of public authorities in its decision-making and control processes.

On the other hand, the Anglo-Saxon model is based on the notion of market and on a strong delegation of state prerogative to relatively state-independent regulation agencies. For example, in Great Britain, the government keeps a general regulatory power—the control by law and regulation of the organization rules and functioning principles of some economic sectors (water, gas, electricity, telecommunication, lottery, etc.). It keeps a certain regulation power—it grants telecommunication licenses on its own and does not delegate this responsibility to the regulation authority. The independent regulator is in charge of protecting the consumer as well as making sure that the technical and economical conditions are maintained for a satisfactory "all purpose" service. In fact, it mainly cares about regulating relationships between private and public participants in some monopolistic sectors. In France, the Higher Council for Radio and Television (CSA) and the ARCEP (the high authority for electronic communication and mail regulation) consist of independent personalities and are similar to the Anglo-Saxon regulation agencies.

For the time being, these two conceptions are in competition in the market, but from France and of the United Kingdom, an emerging model is integrating features from both, with a predominance of the Anglo-Saxon model. The interaction between the licensing authority and the concessionary, as well as the "regalian" manner in which the first one behaves with the second, is a common point of both models. This behavior finds its explanation in history.

4.6.1 The British PFI Model: A Massive Call on the Private Sector

This section describes the British model and its typology and then looks at its financial aspects and contractual aspects.

Definition and Classification of the PFI. The PFI is mainly a government program (see http://www.hm-treasury.gov.uk/documents/public_private_partnerships/ppp_index.cfm). The Anglo-Saxon model was developed in Great Britain and around the world from the experience of the PFI, launched in November 1992. It was then taken over by the ensuing Labour governments, and the name PFI was gradually changed into public-private partnership (PPP).

Before being a contractual and financial elaboration, PFI was a governmental program aiming at three objectives:

- Increasing the financing capacity of local authorities by staggering payment and investment
- Improving public utilities with a quality-dependant compensation for the private sector
- Decrease of the public sector's debts through innovation from the private sector

That policy is implemented through a PFI contract that is not defined in a law. The elaboration of a PFI contract is based on the prerogative powers (or Royal prerogatives) that the Crown used to have at its disposal and that are now exercised by the different ministries. That is why the framework of the PFI is made of a series of guides written by the British exchequer. It takes advantage of the government's wide organization power. Even if those guides theoretically have no prescriptive character, they set up the PFI rules and give a minimal frame to it.

In fact, the most frequently used structure is the DBFO (Design, Build, Finance, and Operate), which normally does not say whether the infrastructure has to be handed over or not to the authority at the end of the operation. That generally comes along with compensation from the authority. That kind of contract, as well as shadow tolls, is systematically used for highways. The shadow tolls principle is that an authority signs a contract with a contractor to build an infrastructure and to operate the service for which it is intended. The infrastructure is being paid by the authority once the service begins and in accordance with results and availability of the building.

PFI calls on three types of contract: the PFI contract itself that links the administration and the contractor; a financial contract defining the respective roles of the contractor and of a financial partner; and a direct agreement between the authority and the sponsors. Therefore, PFI is a type of project finance with compensation from the public authority.

An Intense Promotion. The British exchequer created successive working groups to promote PFI among local authorities: the Private Finance Panel, then the Treasury Task Force, and now Partnership UK. A specific organization has been set up for local authorities: the 4P (Public Private Partnership Programme). Its action is relayed by such organizations as the National Audit Office and the Audit Commission, whose role stands close to the one of the French *Cour des Comptes* (the French authority in charge of controlling financial management of public authorities), who are in favor of a mechanism for controlling public finances. This promotion is all the more efficient that the United Kingdom is one of the most centralized countries in Europe in which the central government can *de facto* impose that solution to local authorities.

That flexibility in setup possibilities and the special point made by the successive conservative or Labour governments in the application, promotion, and development of the PLI most certainly explains its boom in Great Britain as well as its fast expansion throughout the world.

Financial Aspects of the PFI: "Value for Money". "Value for Money" is the basic notion of PFI. If you look at the evolution of that model since the beginning of the 1980s, you will notice it covers two complementary notions. First, it makes it possible to ensure that using a PFI is more favorable than using public financing, because the cost of the public debt is lower than the cost of private debt. Once that step as been cleared, it is necessary to find the best possible contract by optimizing the risk sharing. That phase was formerly called *Best Value for Money*. Guides for PFI have grouped both steps under the name of *Value for Money*, probably because they take superiority of private management over public management for granted (see Figure 4.5).

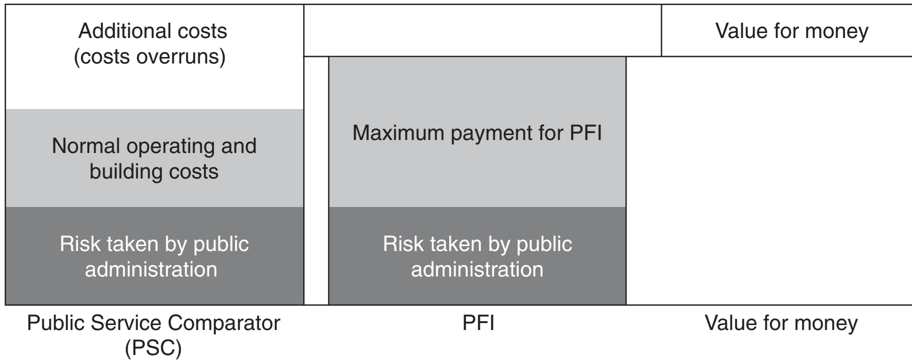

FIGURE 4.5 Superiority of the PFI (according to British studies).

In a PFI, before starting work, the pubic authority must carry out a public sector comparator (PSC) to estimate the cost of the project if it was performed under full public work undertaking. According to British studies (mainly from the Highway Agency), payments are higher in a PFI than in the corresponding PSC, mainly because of higher financing costs in the private sector. However, if the average effective cost overrun is to be taken into account, the global cost for the PFI turns out to be lower than that of the PSC. The difference is the Value for Money due to the use of the private sector.

As early as 1996, central authorities have set up incentive measures—grants awarded if local authorities use PFI—to encourage its usage in Great Britain. The decree granting the measures demands that a variation of at least 20 percent of the price paid to the co-contractor be possible in case of malfeasance. Even if a "test of contract structure" is no longer compulsory, it is advisable to apply it to obtain the approval of the Project Examination Commission in charge of allotting grants. That condition shows that the concessionary must take a minimum risk and that PFI is not a simple "credit sale" of infrastructure.

Moreover, the state-operated legal changes allow local authorities, which are closely supervised by the central authority, to contract freely. In addition, a certification system is established. The local authority–issued certification proves that it is empowered to contract. The certificate allows the authority to contract for periods that can extend over 40 years and shelters the sponsors from the risk of a breach of contract due to an *ultra vires* action from the local authority.

Contractual Aspect of the PFI. Since the securities taken by the sponsors are based on the potential legal implications, contractual aspects are critical in project finance. First you will learn how the *Common Law* reckons with the demands of administrative law, and then you will take a look at the logic of the contracts according to the nature of the compensation paid by the concessionary. Finally, you will analyze the PFI contract in the light of the community law.

Common Law and French Public Law. PFI contracts are submitted to the *common law*. That type of right makes no distinction between a private individual and a public corporation: there is no *public law* in the Anglo-Saxon legal system. Common law is based on two principles: *freedom of contract* and *sanctity of contract*. Freedom of contract is absolute under PFI laws, as is sanctity of contract; the contract must provide for all situations that could alter its operation. To ensure this, some basic notions of continental *public law* regarding the particularities of the public partner have been formulated.

Initially, British rights ignored such concepts as the rights of a local government to modify unilaterally a contract (act of the government) or the impact of acts of God (wars, earthquake, etc.). Therefore, the contract must provide for the possibility for the public authority to modify it as it pleases, as well as the compensating mechanism (impact on the price of the service, recourse to an expert in case of discussion, etc.).

Moreover, British contracts must explicitly provide clauses for law modifications. Generally the consequences are borne by the authority if the modifications are running directly counter to the project (specific tax, and so on), or by the contractor if the new measures are applicable to all (raising of corporate income tax, modification of VAT rate). That wording is reminiscent of the theory of the *act of the government*. *Act of God* clauses are also commonly inserted in contracts; they are largely inspired by the legal theory of “imprevision” (French theory of the unexpected).

To conclude, we can note that numerous clauses of the French administrative right are integrated in PFI contracts. However, even if Anglo-Saxon contracts and those inspired by the Civil code have common points, one fundamental difference remains: French contracts evolve in a fixed legal frame, while PFI contracts are “tailor made” and designed to fit their specific aim. You will see the consequences of PFI on the analysis of project finance contracts and on the resulting principal-agent relationships.

Two Types of Contracts for Two Types of Payment. For PFI contracts with compensation from the authority, two types of payment are possible. The first is based on the use of the work. This is generally the case with highways with shadow tolls. In France, that kind of contract would be associated with the *Convention de Délégation de Service Public* (French contract for delegation of public utility). The second is based on the quality of the service. Generally, the indicator is the availability of the work (number of rooms available in a hospital, quantity of resources available, etc.). That kind of contract could be compared to the French METP (*Marché d’Entreprise de Travaux Publics*). In an METP, the utility is built up and operated by a contractor that is compensated by the licensing public authority, even if the scope of those services is wider in the United Kingdom than in France. In the case of a high school, for example, British companies are in charge of the whole utility except for teaching and curriculum, while the role of French companies is legally much more restricted.

PFI and Community Law. Community law and especially a European Interpretative Declaration on concession from April 12, 2000, considers that shadow toll highways are concessions of works. At the European level, public utilities are assessed with a body of presumptions, and mainly the level of transfer of operating risks, when the nature of the person paying for the service is only one of the criteria. That last notion is nearly the sole criterion retained in France. The French model of concession and the PFI are rather different on the legal level. You will see that this can cause difficulty when the PFI mechanism is applied to countries in which the local right is based on Napoleonic Civil code.

4.7 DELEGATION OF PUBLIC UTILITY IN FRANCE FROM THE MIDDLE AGES TO THE PRESENT

French people are attached to the notion of public services. Perhaps this is due to the fact that public services are part of our everyday lives and that they are a mainstays of our “civil society.” Public and paragovernmental sectors employ about a fifth of the working population In France. The close relationship of French people with utilities comes from the fact that the main services appeared under the *Ancien Régime* (see Bezançon, 1997 and 1988).

Under the *Ancien Régime*, everything was delegated. For this period, two main types of services can be identified: state utilities and local utilities. The first are mainly kingly services (money, registry office, army, and so on), fiscal services (collection of general taxes as well as taxes on salt), state-owned services (state-owned territories, mines, colonies), and infrastructures. Local services encompass urban services (water distribution, urban planning, public light, road systems), and essential services (firefighting, hospitals). Those utilities are based either on necessity or opportunity. Therefore, the building and the operation of canals are a kingly service that is necessary for the good administration of the country, while the mines are state-owned services based on the principle of opportunity.

Utility delegation by king to private individuals was due to deficiencies in state administration and to insufficient tax incomes. Three types of delegation can be identified:

- Local utility delegation indirectly granted to local authorities by the king, through different levels of the feudal system
- Delegation of tax and king-owned territories’ incomes
- Direct delegation by the king of infrastructure building to an individual or a company (canals, bridges, and so on)

All services are not delegated by means of concession—that is, by means of a long-term contract (more than 10 years). The king can also use short-term markets called *leases*. This contractual structure is used for bridge building, for example. It is in fact the ancestor of public works contracts, in which the public authority keeps total control on the operations.

A utility can also appear if a situation of scarcity obliges the public authority to intervene; for example, if maintenance of roads and rivers is poor when tolls taken by the lords should have been used for maintaining them. For infrastructures, things are totally different. These services are created on a single individual's or on a group of individuals' initiative. First the king admits the idea and protects it if it is useful for the authority or if it makes its enrichment possible. The Canal du Midi, formerly called Canal Royal du Languedoc (1665) was built up in that context of direct delegation.

As the king is the only one empowered to authorize and delegate public utilities, a specific relationship is created between the king and the agent who is granted power and who has a wide self-starting capacity in the monopolistic frame that has been created to develop his idea. The compensation for this freedom is the severity of the penalty for failure. If the agent cannot fulfill his mission or is behind schedule, the concessionary can lose his investment. That historical relationship of sovereign and servant sheds a particular light on the relationship between the licensing authority and the concessionary in the nineteenth century or in modern concession in France.

In the nineteenth century, a large number of public utilities appears, such as railways, public transportation (the Parisian metro), telephone, and so on. In addition, the legal frame elaborated with the French Revolution provided larger responsibility to local authorities (departments and districts). The extension of responsibility enables a diversification of local utilities and of their delegation (water, gas, electricity, etc.).

4.7.1 From the Ancient Régime to the Present

The French twentieth century can be divided into two different periods. Before World War II, state control of the economy was growing and service delegation from the public to the private sector was fading. The second period is more recent. The legal system inherited from previous centuries was integrated in a European context, which was little inspired by French but provided a large scope for licensing in Europe.

In France, public utility delegation can be divided into two main parts. The best-known contractual structure is the concession structure in which the local authority delegates to private sector the building of the infrastructure and the operation of the service it is intended to supply. In the case of farming out (leasing), the investment is borne by the public authority, the "farmer" (lease holder) operating the public utility. In any case, the agent is paid directly by the service user, which does not prevent him from receiving grants from the licensor or from other public entities. Numerous other private-public partnerships forms exist.

METP (discussed earlier) reappeared a few years ago and has been used for rehabilitation of high schools of the Parisian area and for some roads in the provinces. This intermediate elaboration standing between utility delegation and public works contracts has been renamed *marché public* (public works contract) by the Conseil d'Etat (French advising authority on administrative matters). In that case, no direct payment is made from the utility user. This new structure seems to have inspired the British structure of the PFI.

4.8 CONCLUSION: THE TENT METAPHOR

An analogy can be used to synthesize and illustrate these mechanisms. In this parable, corporate financing or public call for tenders are represented as a medieval castle. It stands firm on its foundations. It is a solid building that can be relied on, on which you can take securities. Project finance is totally different. Like a tent, it is more flexible and soft. The tent pegs are the different partners—four at least: the licensor, the concessionary, the technical companies (construction, operation, insurance companies, etc.), and the lenders (banks and others). The pegs are linked to the tent by ropes, which are the contractual links between the project and those working for its implementation.

For the tent to hold together and not to get torn apart with the first gust of wind, rope tension must be judiciously shared out to each peg. In the same way, to create balanced contractual relationships, risks must be shared by the various participants to reach as strong a balance as possible. If the rope is too tight, the tent can lose its footing, and the same idea applies to a project: if financial and legal structures are imperfect, they can put the implementation of the project at risk or prevent it from producing the services it has been designed for. So is project finance.

In this context, lenders do not judge the stability of guaranties, because there are practically none. They base their analyses on the assumed cash flows produced by the project. To do this, two main criteria are used. Firstly, lenders make sure the financial elaboration is sound, by checking that the operation is properly structured and will not be damaged significantly if one of the fundamentals parameters is modified. Secondly, if the contractual and financial bases are sound, the sponsors check to be sure that the pegs are strong enough, to make sure the different participants' financial standings and technical abilities are sufficient to realize the contractual obligations they have undertaken.

Those elaborations require careful risk analysis, sharing, and insurance from the banks—and more generally from all participants. This is the keystone for project finance.

4.9 ACKNOWLEDGEMENTS

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CHAPTER 5
THE ROLE OF PROJECT MANAGEMENT IN SPANISH PROJECTS

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5.1 PROJECT MANAGEMENT IN SPAIN

The project management profession in Spain is being developed, but it cannot be considered mature. Project management has occurred in major project industries. Although many good project managers are working in Spain, in general, upper management support is not a common behavior observed in most of Spanish projects. More and more, Spanish project managers are better trained, better prepared, and formally recognized as project professionals. However, many organizations and their managers believe that PM is just a tool. Then, as they think it is only a tool, they don't see anything in it for them.

Providing consistency of success with regard to time, cost, and quality objectives is the goal of many Spanish organizations; however, most of the projects are time delayed or over cost. Many Spanish projects fail because a lack of ensuring customer expectations. Few Spanish organizations implement a formal "management requirements method." Sometimes requirements are not documented, or when documented, they are at a very high level. Those situations generate a lot of change requests from the various project stakeholders. However, most of project managers don't use a consistent change management procedure. Furthermore, project managers don't explain the change procedures to the customer or client at the beginning of the project, causing some issues and problems when those changes are produced.

Spanish professionals are not accustomed to collecting experiences and lessons learned during a project life cycle. They don't perform retrospective analyses, so they cannot know what worked, what didn't work, and what they learned from the projects for future use.

Spanish project managers know about the importance of risk management. However, not everyone puts it into practice. Every project stakeholder is conscious of the amount of uncertainty during a project life cycle, but nobody deals with it seriously. You can see an example in the following case study. However, more and more organizations are undergoing big changes, and they need to manage those changes effectively. To do so, organizations need change leaders, and they must prepare their whole organization, project managers, team members, upper managers, and executives in the functions and principles of project management.

From 1998 to 2001, I faced an important challenge in my professional career; I was assigned as a PM for a Spanish banking company that needed to change. The European Union planned to start the Euro implementation in the year 2000. This approaching deadline triggered this particular strategic project. I was forced to improve my professional PM skills quickly, being adaptable and flexible while facing a difficult environment. All the facts related in this story are real facts that occurred in this project. However, I have expressed my points of view and those of my project team. Our experiences and perceptions are included in this story.

5.2 THE CG PROJECT

This real case focuses on the process of leading a project in CG, a Spanish banking company, to reduce resistance to change and to take advantage of favorable existing conditions. Every change is traumatic, and this project involved a lot of effort and change from everybody in the organization. Keeping a banking company among the leaders in the market depends on its capacity to be flexible and to change behaviors, skills, structures, and processes. People need to exchange information regarding the process of change and have that information accepted as valid.

Hewlett-Packard Spain was chosen as a main contractor for this project and was the leader in managing this important change. The project manager and his team were able to manage the changes through project management skills and processes. The success of the project was mainly due to the organization's willingness to learn and ability to motivate the project team to never give up in the face of extremely difficult situations.

5.3 CUSTOMER BACKGROUND

CG is a medium-sized bank in terms of business and people. This entity is a well known organization located in the south of Spain, in the city of Granada. CG was using the Unisys platform from 1979 without any problems. Employees were accustomed to the philosophy of mainframe support from Unisys and had a lot of experience in the operation of that platform. The infrastructure's technical environment characteristics were as follows:

- They were operating through an Unisys computer (Clear Path IX 4802-H2).
- Their applications were developed by a Software Development Department.
- All the applications were developed in COBOL 74 programming language.
- Databases were DMS and RDMS.
- Transaction monitor was HVTIP.
- TCP/IP communications were implemented under X-25.

The results of this organization had been positive during the last 10 years. Customer satisfaction surveys had achieved good results. CG was happy with its systems and the results were a clear indicator of profitability and business stability.

CG had a bureaucratic culture—that is, procedures followed established rules. People placed high value on loyalty, and political success came from knowing how to play the system.

5.4 WHY CHANGE WAS NEEDED

Although CG's stability and business results had been good during the past 10 years, its systems and methods had remained static for many years and did not allow for rapid and substantial change under tremendous competitive pressure. As part of it business fundamentals, CG developed a strategic plan for the next two years (Figure 5.1). Its main goals were as follows:

- Financial market changes adaptability
- Business to IT alignment
- Information systems cost reduction
- Less development time for new products
- Strategic position placement in front of European community
- Open systems evolution
- Implementation of an standard market financial solution

CG had a clear idea that its users were happy operating with the old system, but changes were needed quickly to allow the organization to survive among its banking competitors. The proximity of the year 2000 forced financial entities to be prepared by updating or creating processes, training people, and upgrading or changing technology. By considering those principles, CG focused on four objectives:

- Euro currency implementation according to European Union rules
- Availability of an information system that is Y2K compliant
- IT and development costs reduction
- Implementation of a financial solution, using a standard software package

After a short period of time, they elaborated a requirements document and they submitted requests for proposals (RFPs) to different software and hardware vendors such as NCR, IBM, DEC, and HP. They started a selection period that took two months and finally selected HP as the main contractor and system integrator for the project (dubbed “Red Castle”). The project started by September 16, 1997.

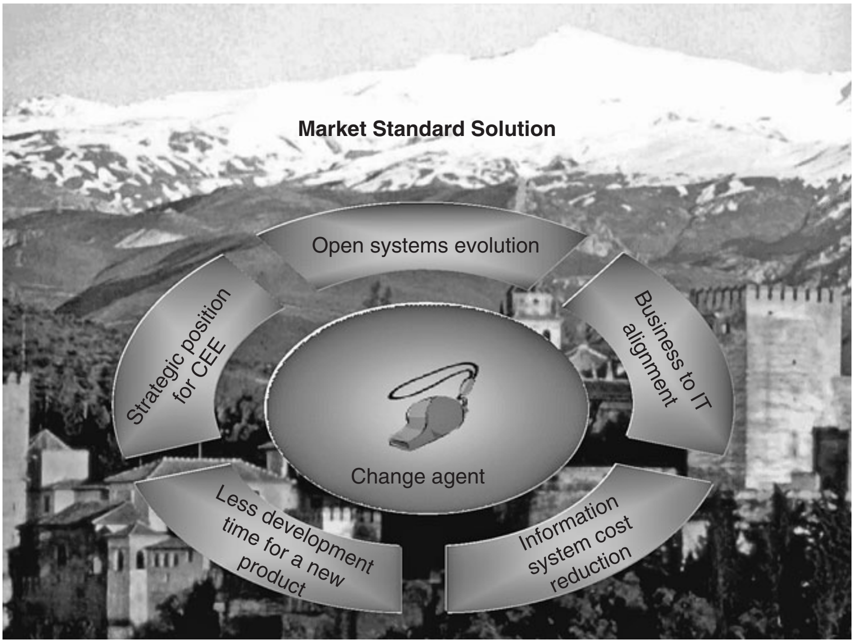

FIGURE 5.1 Why CG needed to change.

The project manager was tasked with creating an effective communication strategy to deal with all people in the organization; this type of change tends to focus primarily on the technical aspects of the project and places insufficient attention on managing the complex interaction among affected stakeholders.

5.5 THE PROJECT

Red Castle was an information systems strategic project. That project consisted of functional and technological innovations that sought answers to CG's market and environment needs (Figure 5.2).

The project was based in two fundamental customer decisions:

- Selection of open systems as technological platform, replacing the old one
- Implementation of a new software package as functional solution

We needed to accomplish many tasks and activities to achieve the goals of this project. To meet the challenge, we divided the activities in two groups: IT activities and change management activities.

Information technology activities included the following:

- The infrastructure definition and implementation (operating system, software, communications)
- The customization of the software package functionality to the customer needs
- Both systems living together (old and new)
- The customization of the "front office" application
- All the data migration
- Data warehouse development
- The implementation

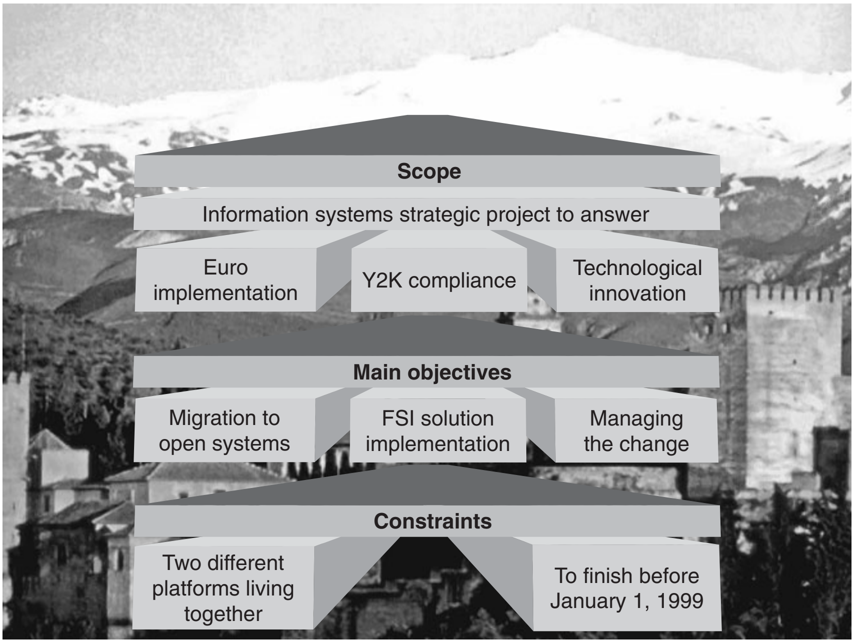

FIGURE 5.2 The project scope, objectives, and constraints.

Change Management activities included the following:

- Organizational impact analysis
- Process analysis
- Communications plan
- Functional training
- User training and information
- User manuals preparation
- Users support
- User training
- Management training
- Bank's customer communication

Before implementing a project, it is crucial to measure the client's readiness for project implementation; we did an assessment to raise the awareness of the organization's current positioning for the changes caused by the project. Our focus was to know more about the situation and the attitudes of the people involved. We assessed eight critical factors for the change: motivation, commitment, shared vision, culture, alignment, communication, planning, and skills. We did that assessment with all project stakeholders, at different layers in the organization, to collect a variety of opinions.

Motivation for the Project. CG had a convincing business need for the project. The bank would be facing significant risks if the project was unsuccessful. The level of dissatisfaction with the current situation not was mutually shared by employees and management, however. Not everyone involved felt a sense of urgency to make the changes. However, those affected by the project would be highly impacted. Customer professionals were not motivated at the beginning of the project, because of the extra work it would involve, including extended working hours.

Commitment. The bank's steering committee expressed to the solution provider (HP) that the Red Castle project was a strategic project with much commitment from the top. Sponsorship for the project was publicly committed, including the time and money required to sustain the changes. The project sponsor was the IS manager, who clearly understood his responsibility. A guiding coalition (executives leaders supporting the sponsor) was in place to the project. However, not all the first-line managers actively supported the project.

Shared Vision. We found a tight link between the vision for the project and the organization's overall vision. The articulated vision of the change was understood and shared by all project stakeholders, and strong leadership was in place to sustain the vision for the change.

Culture. CG was structured as a hierarchical organization, not a project based organization. They had no project culture, but this needed to change in order to survive. The implementation approach was not appropriate to the organizational culture, but the strength of the culture was likely to reinforce the change direction. Previous changes were managed well in that organization, and the degree of trust between managers and employees in the areas of change was high.

Alignment. CG had established some reward structures to encourage employees to make necessary changes. However, the level of stress in the organization was high, and CG's project resources were not completely aligned.

Communication. CG didn't communicate effectively; communication didn't reach all those involved and was not understood at all levels. However, we created a communication plan that was implemented. Furthermore, we provided multimedia presentations for communicating within the CG organization.

Transition Planning. Though we did not have a very detailed transition plan, potential problems and risks were identified and plans were in place for resolving them quickly.

Skills. The change agents possessed sound skills for implementing the change process. Not all the people affected by the change had the technical and job skills necessary to perform the new activities assigned to them. Teamwork was developed within the organization with the help of the HP team.

5.6 DIFFICULTIES

One of the most complicated tasks was to convince upper managers of the bank about the necessity of project planning. I was working with bank managers and my team for two months in organizing and planning tasks.

At the beginning of the process, bank management was very involved. After the first month, managers asked me to show tangible results. I tried to explain that planning was absolutely necessary for the project's success, and that tangible results would come in time. After one request, I decided to borrow some HP equipment to demonstrate to managers how HP was able to operate on this platform. That demonstration diminished the managers' anxiety somewhat, but they were still unhappy and didn't understand the role of project management and planning before implementation of changes. They didn't understand the value added by the HP project manager during that period.

Project deadline management was also problematic. The project deadline was impossible. In the best case, we would achieve only 80 percent of the bank's expectations by deadline. The process we applied, based on the HP project managers' experience managing changes, was valid, but the project duration could not be compressed and adjusted to meet impossible project deadlines.

Managing difficulties during the project was a part of managing the changes, and also falls under the realm of the project manager's responsibility. Clear communication and the intimacy with the managers of the bank were critical for success. I spent many hours talking to the management team, discussing issues and problems; that was a fantastic opportunity to gain credibility, confidence, and finally a trusted relationship with them. I showed them that the Red Castle project was linked to the bank's strategy.

5.7 THE PROCESS

Upper management had assigned the highest priority to this project, and this decision was announced and communicated to the different management team levels. However, deployment was not easy. Based on HP's experience in leading changes, I applied the process defined by the PMI (Project Management Initiative of HP) to get support for those changes and to try to minimize the impacts within the organization.

The process consisted of the following steps:

- Identification of the key players
- Development of an implementation plan
- Understanding behavioral patterns and reactions to change
- Leading the change process

5.7.1 Project Key Players

At the beginning of the project, I had to identify the project stakeholders, which took more than two months after analyzing all the critical players in the organization. I met with these people in an attempt to understand the CG project politics. Anyone who has operated in a political environment recognizes that politics is the art of influence.

I tried to create a climate of trust and clear communication among the team members and other project stakeholders. Beginning with the first month of the project, I organized periodical meeting sessions to get people involved and informed about the project status. One of my daily tasks was to be available to facilitate information flow and communication among team members. This behavior started a culture change for the bank's employees, who were not accustomed to sharing information.

One of the critical success factors was that the sponsor of this project had authority to commit resources in support of the HP project manager. This project was considered a strategic move for the bank and was linked with its business objectives. On many occasions, the HP project manager was asked to attend a bank general managing committee meeting to verify the kind of support provided by the bank to HP. I had the opportunity to escalate some problems in the organization to the bank's management team.

The model I used established four categories of key players:

- **Advocates** want change but do not have the organizational power to sponsor it themselves.
- **Sponsors** have the authority to commit resources.
- **Agents** carry out the change.
- **Targets** receive or adjust to the change.

I had to act as the agent of the change to plan, understand the culture, and proactively create synergy, identify who will be affected by the change, and passionately build a vision that people adopt because they believe in it. At the beginning of the project I was an advocate. I had to be proactive, self-confident, and I had to gain customer confidence to create an open line of communication between the team using the HP management team support.

Understanding the bank's management structure took some time. It was initially difficult to convince the bank managers of the importance of organizing, planning, and defining team leaders. Continuous technical and organizational discussions were helpful in establishing the process of creation, formation, and performance of team leaders.

Figure 5.3 is an example of the tool we used to identify, assess, and evaluate project stakeholders.

Figure 5.3 graphically represents the level of power/influence and the level of interest from each project stakeholder. We evaluated stakeholder concerns and power through identification, assessment, and segmentation to develop a stakeholder assessment grid, based on the following:

- Power: factors and weights
- Level of concern: factors and weights

This exercise was fundamental to understand the Red Castle project politics. It was helpful for me as a project manager to exert influence without authority during the project. I updated this matrix periodically to see how project stakeholders were gaining or losing interest in the project and how they were gaining or losing power/influence.

5.7.2 Implementation Plan Development

We identified the events necessary to guarantee the changes to help bank personnel understand the value of the change. We involved all the team leaders early in the planning phase, discussing different options to be implemented with them. Every team leader was responsible for a different functional area, and they knew the old system very well.

We had to analyze the gap between the old and new systems and applications. The plan also needed to take into account the changes in processes, systems, people, and organization. Then we developed a plan for implementing the changes, taking into account the possible impacts and contingencies in terms of process, people, and technology.

We asked for support of upper management to facilitate the changes and shared facts and rationale to help them understand the plan's effectiveness. When the plan was finished, we asked for approval for the implementation plan to the sponsor and gained consensus of the steering committee and from the others stakeholders in the organization.

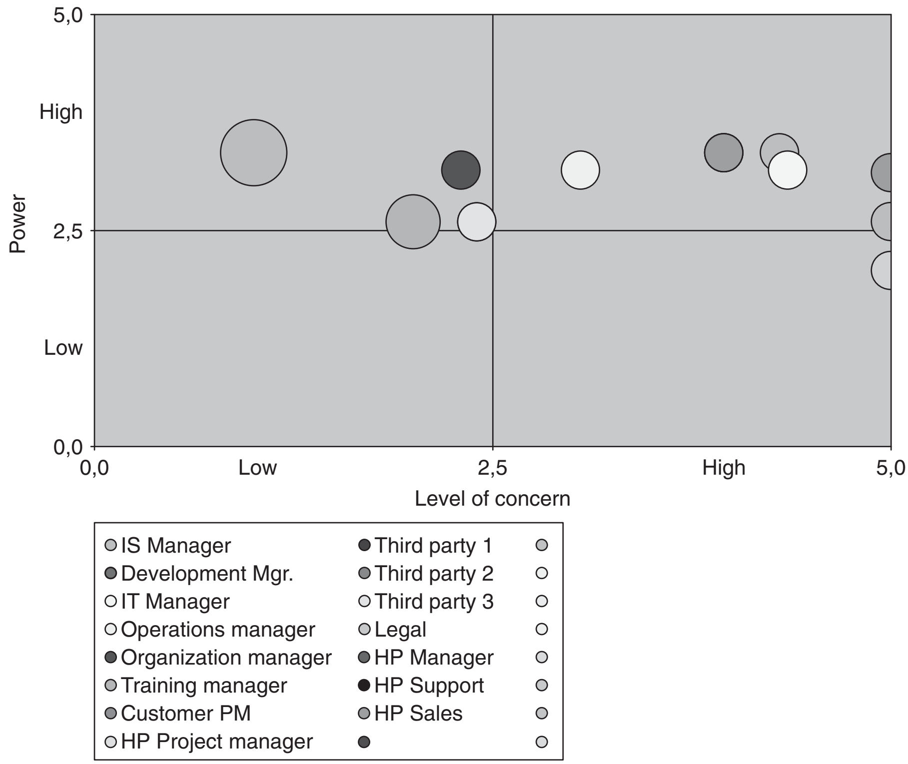

FIGURE 5.3 Stakeholder assessment.

Then we developed a communication plan to transmit to everyone in the organization what was changing, what was not changing, and why. The process of communication was difficult:

- Presentations to branches and offices
- Presentations to all the branch directors
- Local meetings with every general manager
- Distribution of project status newsletters
- Distribution of formal e-mails containing project status

We explained group by group that all people involved would collaborate in the following:

- Deciding the changes to be included in the new application
- Establishing changes to the working procedures
- Participating in the pilot tests
- Acting as internal trainers

We explained that everybody should do the following:

- Communicate and talk about the Red Castle project
- Receive information
- Start to use the new system

The management team transmitted the following message across the organization: "We have a great opportunity in front of us to improve our entity. We need you. Only with your contribution and collaboration will we be able to achieve project success and guarantee better customer service and a better professional future for all of us."

The management also communicated to all project stakeholders how the project would affect them:

Change is traumatic by definition, and because of that, this project take the effort of everyone. Some people will participate directly (attending meetings, validating and elaborating documents, delivering training) along with other responsibilities. All of us are challenged to achieve project success. We are in a competitive environment and we need to be adaptable to changes to survive. The Euro implementation and the year 2000 are some examples of upcoming challenges. We want to take advantage of those efforts to move forward toward a better future for all of us.

5.7.3 Understand Behavioral Patterns and the Reactions to Change

When people are impacted by changes, they can go through a psychological process that can actually mirror that of personal grief. As usual in this type of projects, we detected some inhibitors to the change during the project life cycle. I conducted personal meetings with all the branch directors to clarify project goals and objectives and convince them of the major benefits of the project for them and for their business.

The change was imposed by the bank, but we were explaining group by group all the reasons and justifications for that change. As a result, resistance was diminished as we established better communication, but this task was a step-by-step process reinforced with our meetings in every branch of the bank.

The bank was stable in terms of process, people, and technology, but upper managers knew how to motivate and compensate people to encourage extra effort. They knew they couldn't ask for extra effort without compensation. Then they defined some metrics and personal objectives for every team leader in the project.

Six major stages can be easily identified in response to change. People will progress through them at different rates, and the introduction of new change initiatives over existing ones can actually force people to move forward through these stages or to regress.

Stage 1: Shock. As with a grief reaction, people can take some time to address the reality of what has just occurred. They can't really do much at this stage but come to grips with what the new situation entails.

Stage 2: Denial. A common reaction is to deny the impact of the change. In the beginning, most employees of the branches felt uninvolved because they believed they were not implicated in the initial study. We needed to make an extra effort to get those people involved. We planned a lot of visits to all the branches and offices to encourage their commitment to change. A ritualized "farewell" to the old ways helped people move through this stage. We emphasized that the bank would be changing its entire front-end infrastructure one year before starting this new project. Some people were tired and they felt that their input was not welcome. It was difficult to elevate the morale in those cases.

Stage 3: Anger. It was important to deal with people's anger. "Why did we need to change at all when the way we were doing things was fine?" Some may actively resist or attack the change. Anger compromises skills and can engender a mood of self-preservation. This promoted risk avoidance and stifled innovation.

Stage 4: Passive Acceptance. People eventually accept that things are changing and that the old ways are in fact gone. "I suppose if we have to deal with this, we might as well get on with it." One of the success factors in this process was to recognize the different behavioral patterns and to spend enough time working with everybody in the organization.

Stage 5: Exploration. This stage represents people's willingness to look at the actual methods for implementing and taking the change process forward. "How do we actually go forward from here?" CG employees were conscious of the challenge they had and what was required to move forward. We made many mistakes, but our exploration ended successfully.

Stage 6: Challenge. Actually going forward, we ensured that the change process was a catalyst for continuous improvement and was not an obstacle. We moved forward step by step. Staying focused on learning from our mistakes at every project milestone was key for success.

5.7.4 Leading the Change Process

We defined eight functional groups with different goals for individuals. We empowered team leaders to participate in project decisions. I looked for team consensus after they had all the facts at hand. Empowerment was a key success factor. However, CG was hierarchically organized, and my approach generated some issues at the beginning. To create a spirit of teamwork among the project team, I needed the upper level support. I tried to maintain a positive attitude among the team.

We invited people to express their reactions to the change throughout the project's life. This feedback was time consuming but very valuable to help us learn from our errors and try to improve the process. Every month, I organized informal feedback sessions.

We established some metrics for people to allow room for improvement and recognize the efforts and achievement of the team and the team's leaders. This recognition strategy was consolidated step by step, celebrating all the major milestones throughout the project. We also published a monthly newsletter to provide public recognition to the contributions of team members. Furthermore, we celebrated a monthly two-hour meeting in which "good achievers of the month" were announced and recognized. This encouraged competition between teams and improved morale.

Follow-up consisted of weekly brief reviews with the team leaders, analysis of the results, and learning from the real experiences. Follow-up was difficult to implement in the beginning of the project but because easier as each milestone was reached. We used administrative staff to collect information in a standardize format according the project methodology.

5.8 THE TEAM

The Red Castle project involved about 100 professionals from different areas throughout the bank organization (branches, headquarters, information systems, organization, marketing, etc.). More than 20 people from HP were involved. All the resources for the application software were subcontracted and managed by HP.

The team comprised a group of functional team leaders who owned the whole project life cycle for every functional area in the bank. Every functional leader was responsible for talking and meeting with employees, leading his or her software development teams, managing all the tests, and so on. These leaders were trained by HP consultants to manage and motivate their teams. The HP project manager supported them throughout the project.

Steering Committee members also participated not only in the sponsorship tasks but in all the communications and dissemination tasks to contribute to project success. They communicated with and supported employees, boosted morale, and recognized employee efforts in a public way.

Forming the team was a continuous process of

- Explaining their responsibilities/ownership
- Explaining the project objectives
- Conducting branch presentations
- Managing change resistance
- Transmitting security and confidence

5.8.1 The Tools

Projects fail, not for technical reasons, but because people in the organization refuse to make the changes required. The critical success factor for implementing systems is the way in which the human and organizational factors are planned; technology is a second priority. This message wasn't understood by all the management team at the beginning, but after six months, people understood the message.

We used the following tools to build the teams:

- Teamwork exercises
- Roles and responsibilities definitions published in the planning documents (Quality Plan)
- Change agent training
- Daily communication among team members
- Asking for feedback to every team leader
- Communication

Teamwork Exercises. CG professionals were not accustomed to working in teams. Teamwork exercises were stimulating problem-solving tasks designed to help group members develop their capacity to work together effectively. Many team-building and initiative tasks were like kids' games; others were novel, complex tasks and designed for specific needs. An important part of team building exercises was the participants' reflection and discussion about the activity, how they approached the situation, and possible points of learning. For example, a group was video recorded during an activity and the video was watched, analyzed, and discussed to help extract lessons from the team building exercises.

Roles and Responsibilities Definition. The following roles and responsibilities for the CG project were defined.

Project Manager. This person is responsible for ensuring that the project team completes the project. The project manager develops the project plan with the team and manages the team's performance of project tasks. The project manager secures acceptance and approval of deliverables from the project sponsor and stakeholders. The project manager is responsible for communication, including status reporting, risk management, escalation of issues that cannot be resolved in the team, and in general making sure the project is delivered within budget, on schedule, and within scope.

Project Team Members. Team members are responsible for executing tasks and producing deliverables as outlined in the project plan and directed by the project manager, at whatever level of effort or participation is defined for them.

Team Leads. Team leads provide task and technical leadership, and maintain a portion of the project plan.

Project Sponsor. The project sponsor is the IS manager with demonstrable interest in the outcome of the project, who is responsible for securing spending authority and resources for the project. The project sponsor acts as a vocal and visible champion, legitimizes the project's goals and objectives, keeps abreast of major project activities, and serves as a decision-maker for the project. The project sponsor participates in and leads project initiation and the development of the project charter. The project sponsor provide supports for the project manager; assists with major issues, problems, and policy conflicts; removes obstacles; is active in planning the scope; approves scope changes; signs off on major deliverables; and signs off on approvals to proceed to each succeeding project phase. The project sponsor chairs the steering committee. The project sponsor may elect to delegate any of the above responsibilities to other personnel either on or outside the project team.

Steering Committee. The steering committee includes management representatives from the key organizations involved in the project oversight and control and any other key stakeholder groups that have special interest in the outcome of the project. The people participating in the steering committee were the IT manager, the operations department manager, the development department manager, the organization department manager, the provider's sponsor and the customer sponsor, the customer project manager, and the provider project manager. The steering committee acts individually and collectively as a vocal and visible project champion throughout its representative organizations; generally it approves project deliverables, helps resolve issues and policy decisions, approves scope changes, and provides direction and guidance to the project.

Customers. Customers are the business units that identified the need for the product or service provided by the Red Castle project. Customers can be at all levels of an organization. Since it is frequently not feasible for all the customers to be directly involved in the project, the following roles are identified:

- **Customer representatives** are members of the customer community who are identified and made available to the project for their subject matter expertise. Their responsibility is to represent their business units' needs accurately to the project team and to validate the deliverables that describe the product or service that the project will produce. Customer representatives are also expected to bring information about the project back to the customer community. Toward the end of the project, customer representatives will test the product or service the project is developing, using and evaluating it while providing feedback to the project team.
- **Customer decision-makers** are members of the customer community who have been designated to make project decisions on behalf of major business units that will use, or will be affected by, the product or service the project will deliver. Customer decision-makers are responsible for achieving consensus of their business unit on project issues and outputs, and communicating it to the project manager. They must attend project meetings as requested by the project manager, review and approve process deliverables, and provide subject matter expertise to the project team.
- **Stakeholders** are all those groups, units, individuals, or organizations, internal or external to the organization, that are impacted by, or can impact, the outcomes of the project. This includes the project team, sponsors, steering committee, customers, and customer coworkers who will be affected by the change in customer work practices due to the new product or service; customer managers affected by modified workflows or logistics; customer correspondents affected by the quantity or quality of newly available information; and other similarly affected groups.

Change Agent Training. Change agents must have the conviction to state the facts based on data, even if the consequences are unpleasant. The first step to becoming an effective change agent is acknowledging personal, ingrained beliefs and values. Self-inspection is terribly necessary, yet extraordinarily challenging, for all leaders.

Change agent training is a tailored program that gives people a solid skill base in three basic tenets of change management:

- The power of vision and direction
- The emotional process of people and change
- The use of ownership and engagement to drive accountability

Daily Communication Among Team Members. It was impossible to communicate to every team member (150 people) on a daily basis. I talked every day to all team leaders (eight people) to keep the communication flow alive. Having breakfast or lunch together was an easy mechanism to interact with project leaders. It was sometimes difficult to meet all of them, but I tried to do so, and I never made these meetings mandatory. I kept the philosophy of "nothing by obligation but by devotion."

Asking for Feedback of Every Team Leader. Not all team leaders were open people. Most of them were very technical and at the beginning they concentrated only on the work to be done. In many occasions when they got a difficult problem or issue, they never told me about it. I organized a 30-minute session every Friday, after breakfast, asking for feedback from team leaders. At the beginning of the project nobody talked, but when I eventually gained credibility among team leaders, sessions were powerful.

Communication. I took care to maintain respect among team members. Communication discipline was one of the key success factors. I had to educate all team leaders about that. All organizations know that communication takes time and effort, but the investment is worthwhile. It is critical for people to be reminded of the vision but also how far they have come. This helps maintain morale and belief in the change process. Positive evidence that things are changing will combat any cynics.

Communicate about 10 times more frequently than you think is necessary. Recent research shows that on average the total amount of communication with an employee during a three-month period is 2.3 million words or numbers, transmitted in meetings, notice boards, bulletins, etc. The typical communication of a change vision during a period of three months is approximately 13,400 words or numbers. So on average the vision communication captured only 0.58 percent of the company communication market share-not enough.

Communication is not through words alone; it's the dance and the music too. Clear messages are sent through actions. It never ceases to amaze me that companies struggle to relaunch an improvement program after just having concluded downsizing, where change facilitators were first on the list to go.

5.8.2 Quality Assurance

We established a project office for the Red Castle project, and the members assigned to the project office needed many skills to perform quality assurance within each project. A variety of methodologies, software applications, procedures, tools, and templates had to be employed.

Because the project office employee worked on multiple projects, knowledge and experience with methodologies, software applications, procedures, tools, and templates built up faster than it would with project managers on single projects. The project office is responsible for quality assurance; improvements can be implemented and communicated faster with a project office.

The project manager was responsible for the overall project delivery process. The project office employees were not expected to know the project technical content through and through. A quality plan was finished, and quality reviews were conducted at every project milestone.

To improve project performance, you must assure project quality control throughout the project life cycle. When you can achieve a goal, you need to take some time for review. The steps we followed are listed here:

Planning for Review. We gathered data using the project file. The PMO took care of filing and sorting all the project documentation to keep the project manager informed. Management and team members were committed to participate actively and take actions on findings so people could take part in the current as well as future reviews. We scheduled a date for each project review. Logistic details were provided by the project office.

Conducting the Review. The review leader must be a project manager from the PMO, external to the project to be reviewed. A reporter must be designated to help document key points of the meeting. An automated checklist and use of flipcharts can be helpful to collect data from participants.

Taking Action on Findings. During the meeting or in a follow-up session, group the data into categories and then prioritize, either by group discussion or voting. Identify action items and assign owners for all recommendations, priority items, the top five, or one important (critical) item. After reaching consensus on results (or divergence of opinion is noted), summarize project success factors, recommendations for further study, and action items with owners and due dates. Set expectations (scope, investment, time) for each item. Send a copy to the team.

Follow through with owners of action items. Break down significant problems into root causes. Place review reports in the project documents file, on the web, in the quality/productivity departments, and in the entity library. Make reports available to managers of the life cycle process for similar projects.

Perform Continuous Improvement. We encouraged the quality manager or a designate to look for recruiting themes that emerge from review meetings. This person should highlight trends and escalate chronic problems.

Reviews are a check process in the "Plan-Do-Check-Act" cycle of a quality cycle; they are not just a one-time event. In this context, act on recommendations from previous projects; plan to capture data about your project; perform continuous improvement; and check on how you are doing with a retrospective analysis.

Conduct periodic project reviews that will trigger mid-project corrections. Conduct immediate, informal retrospectives after solving unexpected obstacles. Understand any impact on the reminder of the project. Recognize people for extra efforts and noteworthy contributions.

Be open to attend reviews for other projects. Learn from similar ventures, warranty failures, customer surveys, and experiences of other divisions and companies. Be part of a continuous organizational learning program that includes experimentation, evaluation, and documentation with easy access and retrieval.

5.8.3 Results and Benefits of Project Quality Reviews

The main benefits of the project quality reviews are the project status is formally visible to the whole organization. It creates awareness and room for improvement. Only with detailed reviewing of every project can we have a clear idea about the lack of knowledge, mistakes, errors, deviations, and their reasons. The project quality reviews help the project manager and his or her manager to make the necessary adjustments and take the actions needed to achieve the project goals of finishing the project on time, scope, and budget.

We can find benefits for the project manager, for the customer, and for the sponsor: For the project manager, the process helps in terms of discipline and control. For the customer, in the way that process is anticipating results, it creates a kind of proactive behavior in the project manager anticipating potential problems to the customer. For the sponsor, this process helps him or her to know more project details and then to ask the customer upper management level for clarification.

Management expectations are crucial for the project success and I believe project reviews add value to that.

5.9 THE RESULTS

From the customer perspective, we can measure the project's results according to different parameters, but when we talk about the management of change, we must talk about process, people, and technology that are the enablers of a change.

5.9.1 Process

Processes must be defined, modified, and used by people. Though process is one of the most difficult aspects of this project, people involved in that area were proud because they had the opportunity to be part of the project success and then to be members of a successful bank. Due to the old processes review, they defined new processes, allowing them to take new products to the market. Process ownership was the key. The owners were assigned based on process knowledge. The Organization department was a key contributor on those activities; they organized some training sessions for the customer professionals to expand their knowledge of processes. The manager of that department showed a lot of leadership and empowered his people to get the job done.

One of the good practices that helped us was running "project snapshots," half-day sessions whose purpose was to capture lessons learned during a project, identify knowledge for reuse, and identify opportunities for skill or methodology improvement for all project stakeholders. Following were objectives of these sessions:

- Reflect upon successes and lessons learned in project selling and implementation phases
- Focus on key themes such as project and scope management, communications, issue management, problems, successes
- Leverage successes and learn to deliver subsequent phases of the project effectively
- Identify tools and best practices that can be shared more broadly

Process Value. Process sessions generate value for the professionals, for the project team, for the project manager, and for the rest of the organization.

For Professionals. It leverages team members work and experience through sharing lessons learned and prevents redundant activities by having all team members understand what each person has/is working on. It resolves issues earlier in the project by getting them surfaced and resolved.

For the Project Team. It leveraged learning and successes for ongoing project work, and it delivered a more consistent implementation by having everyone on the project better aligned. And the project team and selling team could better understand client perspectives (when clients are involved in the sessions).

For Other Project Teams. They can reuse existing tools, identify project teams that have completed similar projects, and utilize their learning to enhance project outcomes and avoid costly mistakes.

For the Project Managers. They understand successes and opportunities in delivering particular methodologies/solutions and they also understand successes and opportunities in selling and delivering solutions.

For the Organization. As non-value adding work is eliminated and more attention gets placed on improving customer satisfaction and increasing sales.

The time dedicated to those sessions was included in the project plan. The sessions take no more than two hours if planned properly, and the PMO and the project manager need two or three hours of session preparation. After the session, they usually spend about 1 more hour for reporting purposes.

What Is the Process? The process involved four steps: prepare the session, conduct the session, collect learning, and share the learning.

Prepare the Session. The PMO worked with the project manager to gather background and identify one or two major project areas or subjects to discuss during the session, create an agenda, and invite session participants.

Conduct the Session. The project manager, using the PMO as a facilitator, reviewed the purpose and themes to discuss, and set the ground rules with the group, defining the "project snapshot process."

Collect Learning. The facilitator took notes of key learning or material to be submitted, pulling out sufficient details from the participants so that results would be reusable. The facilitator probed meeting attendees for "What went well, lessons learned, recommendations, key collateral and/or intellectual material for reuse." He summarize key learning from the session and prepared a presentation.

Share the Learning. The project manager and selected members of the team shared learnings with appropriate parties. The PMO distributed outcomes to teams responsible for any elements used in the project, including solution development teams, and to people development managers.

After the session, the facilitator collected the outcomes on a document or template, and reviewed it with the project manager prior to distributing to the team or posting on the web site.

The PMO played the role of facilitator and reporter in those sessions. The project office helped the project manager in all project snapshot preparation and logistics. At the beginning, I, as an experienced project manager, facilitated those sessions and trained the project managers to do it. The results were very good. I got participant comments such as, "It was a great opportunity to talk among team members and managers openly," and "to think and discuss about what happened and not about who was guilty has been great."

5.9.2 People

Another important result is the use of the system by the end user. Step by step, the user adapted his or her behavior to the new system functionality and to the new processes. Any system is tested, measured, and evaluated by the end users. In this particular case, the level of involvement of the end users was growing in a positive way in a few months.

As result of the hard work during the project, the bank has modified its behavior and is starting to develop as a learning culture. HP helped them to run retrospective analysis sessions at the end of each project milestone, and they were very productive. They generated a lot of interesting discussions and stress, but it was an excellent mechanism for learning. Furthermore, customer employees developed a risk management culture and they do not start any project without thinking about what may fail systematically. Contingency plans for all the projects they managed now are mandatory.

5.9.3 Technology

By now, all the software modules of the new application are executed by HP Open Systems and the bank employees are happy with the results. They know the functionality they have now is better than the old one, and they are also conscious that they have the foundation platform for building the future of the information systems for the new century. Technical results have been improved with the new system. The performance of the new system is much improved, and it places the customer in a technological competitive position in the financial market.

From the HP perspective, the team learned a lot from this project. The following were key factors for the project success:

- Upper management sponsorship
- Linking project to the bank strategy
- Quality management
- Communication planning and deployment
- The encouragement of the end user

The HP project manager had to work with everybody on the team with different degrees of involvement. Measuring the percentage of time spent by the PM working with everyone, we can classify it by project phases:

Initiation and Planning Phase

- 100 percent scope validation and planning (time spent with the customer PM, team leaders, and the rest of stakeholders)

Implementation Phase

- About 75 percent of my time as a project manager was spent in communication management (with the whole team)
- About 25 percent of my weekly time was spent in project meetings (team leaders, management, steering committee)
- The rest of my time was spent working in planning, monitoring, and control

5.10 SUMMARY

Helping CG bank remain a leader in the market depended on its capacity to change behaviors, skills, structures, and processes; people needed to exchange information regarding the process of change and have that information accepted as valid.

The project manager had to create an effective communication strategy to deal with all the people in the organization because this type of projects tends to focus primarily on the technical aspects of the project and places insufficient attention on managing the complex interaction among affected stakeholders.

Managing difficulties along the project was a part of managing the change and was also a project manager responsibility. The clear communication and the intimacy with the managers of the bank was a critical success factor. The Red Castle project was linked to the bank's overall strategy, which it was very helpful for us along the project.

The process for leading the change consisted of the following steps:

- Identifying the key players
- Developing an implementation plan
- Understanding behavioral patterns and reactions to change
- Leading the change process

One of the success factors in this process was to recognize the different behavioral patterns and to spend enough time working with everybody in the organization. Proactive scope management and learning to use other existing change process to achieve project goals were some lessons gained in the project. The effort needed was great. In large organizations like CG, even with excellent skills of leadership, all changes require initiatives from many people, and time, patience, persistence, and upper management support.

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EXAMPLES OF PROJECTS FROM SPECIFIC ENVIRONMENTS

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CHAPTER 6
MANAGING PROJECTS FINANCED BY INTERNATIONAL LENDING AGENCIES

Robert Youker

Robert Youker is an independent trainer and consultant in project management with more than 40 years of experience in the field. He is retired from the World Bank, where he developed and presented six-week project management training courses for the managers of major projects in many different countries. He served as the technical author for the bank on the recently published *Instructors Resource Kit* on CD-ROM for a five-week training course on Managing the Implementation of Development Projects. He has written and presented more than a dozen papers at the Project Management Institute and the International Project Management Association (Europe) conferences, many of which have been reprinted in PMI publications and the International Journal of Project Management (U.K.). Mr. Youker is a graduate of Colgate University and the Harvard Business School, and he studied for a doctorate in behavioral science at George Washington University. His project management experience includes new product development at Xerox Corporation and project management consulting for many companies as president of Planalog Management Systems from 1968 to 1975. He has taught in project management courses for American Management Association, Advanced Management Research, Academy for Educational Development, International Law Institute, University of California Los Angeles, University of Wisconsin, George Washington University, the Asian Development Bank, and many other organizations. He developed and presented the first project management courses in Pakistan, Turkey, China, and Africa for the World Bank. He was a founding member of PMI (Project Management Institute) and ASAPM (American Society for the Advancement of Project Management), the U.S. member organization of IPMA (International Project Management Association).

6.1 INTRODUCTION

International organizations such as the World Bank and governmental and non-governmental organizations (NGOs) plan and implement development projects with the aim of improving living conditions in developing countries. These projects differ from other types of projects for a number of reasons, and the approach to management and implementation must also be tailored to local situations. This chapter defines those differences and specifies approaches that are necessary for project success. Though they need to be applied in line with local conditions, the basic project management techniques and tools presented here are required and appropriate for any project.

6.2 WHAT ARE INTERNATIONAL DEVELOPMENT (ID) PROJECTS?

ID projects are medium- to large-size public projects and/or programs in all sectors of developing countries financed by the following types of institutions:

- Multilateral development banks such as the World Bank and regional development banks, such as Asian Development Bank (ADB), African Development Bank (AfDB), Inter-American Development Bank (IADB), Caribbean Development Bank (CDB), and Islamic Development Bank
- United Nations associated agencies, including United Nations Development Program (UNDP), Food and Agriculture Organization (FAO), International Labor Organization (ILO), World Health Organization (WHO), and United Nations Industrial Development Organization (UNIDO)
- Bilateral and multilateral government agencies such as United States Agency for International Development or European Union (USAID)
- NGOs such as, Cooperative for Assistance and Relief Everywhere (CARE), Catholic Relief Services (CRS) or Save the Children
- Government agencies in developing countries

By definition, ID projects involve a number of different actors and stakeholders, including donor agencies (often more than one), government organizations at several levels, consultants, contractors, trainers, evaluators, researchers, and local beneficiaries including local organizations. The various international lending agencies operate in quite similar ways with similar procedures but often with key differences. The banks make loans with normal interest rates to middle-income countries and with very low rates to very poor countries. Other donors often provide grants that do not have to be repaid.

6.2.1 Characteristics of ID Projects

The objectives of ID projects are for economic and social development, often involving poverty reduction, and the usual profit motive is often missing. The international financing agency often has motives and objectives of its own. The financing can be via a loan or an outright grant. By definition, all ID projects are in developing countries and, at least partially, are externally financed. The management of ID projects requires dealing with the entire project life cycle from identification to operations and ex-post evaluation (Figure 6.1).

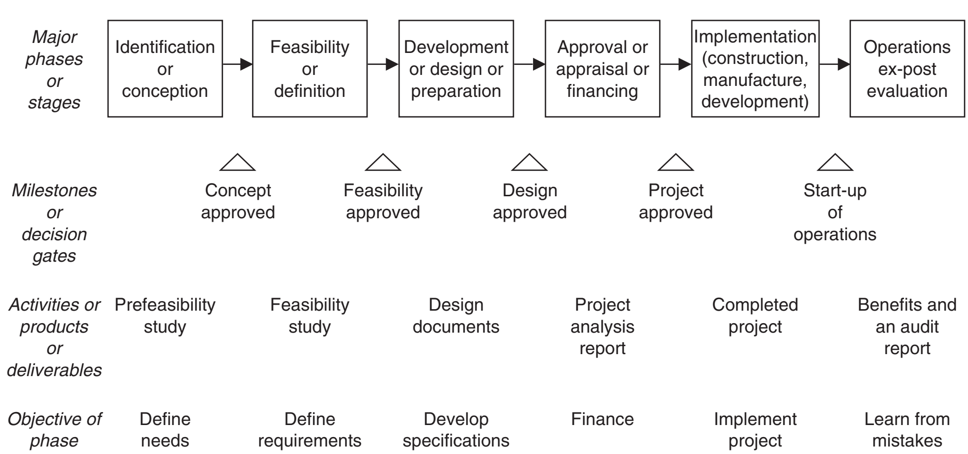

FIGURE 6.1 A generic project life cycle.

All projects can have a variety of interested parties (stakeholders), both positive and negative, but ID projects usually have a very large array of stakeholders whose views must be considered. The role of project sponsor is often unclear. Often times it can appear that the real sponsor is the external agency rather than a domestic party.

Environments in developing countries are varied, often with a lack of infrastructure. All resources are in short supply, especially human resources, such as trained accountants. Local citizens may have unique concepts of time, unique value structures, and local cultures. They may view external forces in a negative or a positive way. Each country has its own systems in place, and each donor may have its own systems; all may have key differences.

6.2.2 How ID Projects Are Different

In addition to the preceding characteristics, ID projects share a number of parameters:

- The financing agency often leads the project identification in line with its own objectives.
- Involving the local beneficiary stakeholders in project discussions is difficult because of language, volume, distance, and communication problems.
- Governments in developing countries are continually short of resources and usually have difficulty meeting the resource requirements they promised at time of project planning and approval.
- Corruption is often an endemic problem and requires monitoring systems to ensure transparency.
- The local government environment is often "nonentrepreneurial" in nature, yet project success often requires an entrepreneurial project manager and project champion. A good example of the value of a local champion on a World Bank financed project was the direct involvement of the Chief Justice of the Philippines in a project to reform the country's entire justice system. He made sure of local support in all aspects of the project.

6.2.3 Types of ID Projects

After World War II, most ID projects were civil works "hard" construction projects such as railroads, ports, dams, and power plants. These had clear goals and could be contracted out to large experienced international firms. They were also called "enclave" projects. During the last three decades, the mix of projects has changed drastically to "soft" projects—that is, projects aimed at human development, such as education, health, and institutional development. Soft objectives are more difficult to define and measure than hard objectives and they require greater involvement of local stakeholders.

Size, of course, is another key difference among projects, which can be small, medium, large, or even mega-sized projects. In addition, whether the project is contracted out or performed by an organization's own workforce is another key difference that has large consequences in terms of ease of management. Finally, after a natural disaster, such as a hurricane, emergency projects ensue, which are different from normal development projects, especially in regard to timing.

6.2.4 How Do ID Projects Get Started?

ID projects, like all projects, go through a project life cycle. Figure 6.1, shown earlier in the chapter, is a chart of a generic project life cycle for a development project. Figure 6.2 shows the same project life cycle but from the point of view of a country. The key difference from a country's point of view is the need to attract financing. Each stage of the life cycle is a go/no-go decision point. The analytical process is iterative in that the same aspects are covered but in increasing detail as you move from identification to final design (Figure 6.3).

Project identification should flow out of a country's strategic planning process, organized by both sector and region. Unfortunately, too often the selection of projects reflects the donor's ideas

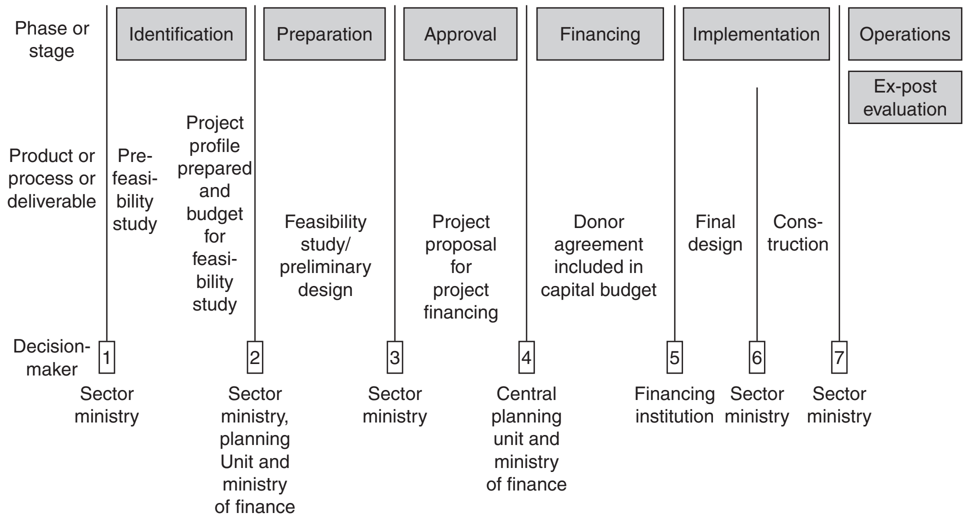

FIGURE 6.2 Typical project life cycle for a country.

rather than the country's priorities. By definition, most ID projects are pieces of longer-range programs. In addition, currently, most donors require that projects be identified as part of a comprehensive development framework and sector or regional program. As part of the project development process, most banks and donors now use a logframe (logical framework) or hierarchy of objectives methodology (see Figures 6.4 and 6.5).

Such hierarchies are now required for all World Bank–financed projects starting with the Sector Related Country Assistance Strategy Policy Objective. (For example: Increase industrial production by 30 percent.) The planning process encompasses problems or opportunities, objectives, strategies, and programs consisting of projects. The development of projects also requires the preparation of

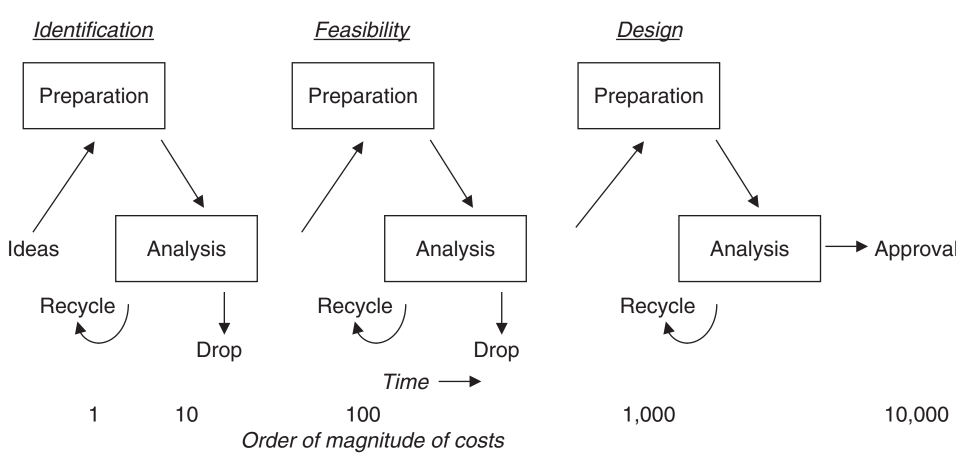

FIGURE 6.3 Preparation and analysis are iterative.

Policy objective	*Increase industrial production*
Strategic objective	*Produce* 50 *MV power*
Project objective	*New power plant*
Input objective	$10 *Million contract, land, labor*

FIGURE 6.4 Hierarchy of objectives for an electric power project.

financial and economic analyses (Figure 6.6) The feasibility study must cover analysis of the technical, financial, economic, institutional, environmental, and social aspects of the project. Economic analysis covers the benefit of the project to the country, while social analysis identifies who in the country receives the benefits. The economic analysis must be used to influence the design alternatives, such as automated versus labor-intensive equipment.

Level of objectives	Means-ends chain	Measurable indicators of results	Assumptions
Policy objectives	*Objective (end-outputs)* Double farmer income to $200	• Per capita income	Price of rice does not fall with increased production
	Strategy (means-inputs) Increase rice production 50%	• Total tons grown • Tons/hectare	
Strategic objectives	*Objective* Increase rice production 50%		Proper use of fertilizer will increase yields
	Strategy Use new seeds and fertilizer	• Number of tons distributed	
Project objectives	*Objective* Use new seeds and fertilizer		Loans will lead to better practices
	Strategy Loans and extension work with farmers	• Number of loans • Value of loans	
Input objectives	*Objective* Loans and extension work with farmers		
	Strategy Bank loan of $10 million	• Level of effort/ expenditure	

FIGURE 6.5 Hierarchy of project objectives.

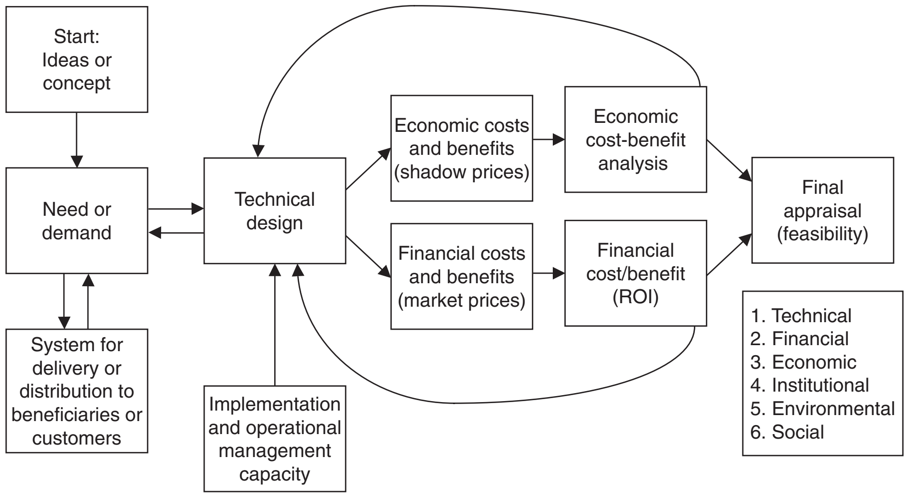

FIGURE 6.6 Flowchart of the project preparation/analysis process.

6.3 PROBLEMS IN MANAGING ID PROJECTS

International lending agencies provide the foreign currency funds for the projects, but the projects are managed by local officials. When projects are completed, the international agencies and the host countries prepare detailed *ex-post* evaluations of all projects. The results of these evaluations are published every year for the purpose of learning from experience. The following is a list of selected problems from a number of years of World Bank evaluation reports:

- Lack of shared perception and agreement on the objectives of the project by donor and government staff and stakeholders
- Lack of commitment to the project by the team, management, and stakeholders
- Lack of detailed, realistic, and *current* project plans (schedule, budget, and procurement)
- Unclear lines of authority and responsibility (organization not structured for project management)
- Lack of adequate resources, especially from government
- Poor feedback and control mechanisms for early detection of problems
- Poor or no analysis of major risk factors
- Delays caused by bureaucratic administrative systems (approvals, procurement, personnel, land acquisition, and release of funds)

Each of these problems can be overcome through the use of normal project management techniques in team planning, such as work breakdown structure and planning, reporting, and control systems.

6.3.1 Required Approaches in Managing ID Projects

Given the specific nature of ID projects and the common problems encountered in developing and implementing them, several specific approaches can be used to improve the management processes.

Rule number 1 is to ensure full participation of locals in the entire process of the project life cycle and to endeavor to develop complete local ownership of the project by both the various levels of government involved as well as all stakeholders. It should be *their* project, not a World Bank Project. The local team must develop shared perceptions of the objectives of the project.

It is also critically important to manage the entire project life cycle, not just the implementation phase or stage. The duration of the average project life cycle from identification to transfer to operations can be as long as 10 to 12 years. The average duration of the implementation phase of a World Bank project is about 5 to 6 years. Since the planning stages before implementation represent about one half of the total project duration, effective management of those phases are just as important as managing the implementation phase in reducing total project duration and usually much less expensive in "crashing" the schedule. Unfortunately, governments are reluctant to appoint a project manager until the financing is assured; often, no PM is available during the first half of the project life cycle and no one is in charge of managing the development process.

The World Bank and other donors often require that the government set up a project implementation unit (PIU) or project management unit (PMU) organization to manage projects it finances. These units are often somewhat separate from normal government channels and are matrix organizations with a project manager and staff having complete responsibility but limited authority over many personnel working on the project, who remain in normal government positions. Matrix organizations are difficult to set up and operate effectively, and they require more attention than donors normally provide. The government and donors need to see that matrix systems operate effectively.

The role of project manager (PM) often does not match the position descriptions in a civil service agency, and government bureaucracies are often reluctant to give them the power and authority they need to be effective. Often, the PM will report to a project director (PD) who is a full time, high level manager in a functional bureaucracy as well as being PD. A steering committee of high officials is set up to provide needed coordination. This arrangement can assist a PM in working across the functions of several government ministries, but it can also create problems if the PD will not delegate authority to the PM.

The appointment of a PM as a "contractor" outside of the normal structure of government can get around the problems of low pay levels and bureaucracy, but it also causes problems in the long run by weakening the regular government structure. The government and donors need to decide on the proper tradeoff between project success and long-range government effectiveness.

On most ID projects the various procurements represent a very high proportion of total project expenditures. Donors have complicated procurement and disbursement systems that often don't match local systems or each other's systems. It is important to start early with a trained local staff and with a well-established procurement system for the project that meshes with the local government system. These donor systems often require much longer to procure items, so the local team needs to start each procurement much earlier than normal.

The multiplicity of actors and stakeholders on an ID project requires a careful analysis of the context or environment of the project. As seen in Figures 6.7 and 6.8, the relevant actors and factors

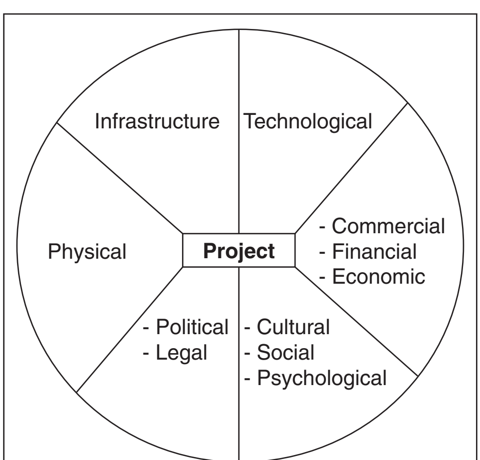

FIGURE 6.7 Scan the project environment by sector.

Actors	Degree of dependency	Degree of risk	Degree of power	Degree of problem
Ministry of finance	High	High	Low	High
Factors				
Rainfall (water)	High	Low (storage dam)	High (irrigation)	Low

FIGURE 6.8 Agriculture project: actors and factors grid.

need to be identified and analyzed to determine the potential risk of problems and to develop possible corrective actions.

Between the early planning stages and the actual start of implementation, a period of two to three years may have elapsed. Personnel and organizations may have changed. Some of the large number of stakeholders may not be aware of the details of the project. The right solution is a series of project startup workshops for the political level, the stakeholders, and the core project team. At this time, it is important for the team to develop a detailed project plan that they own. Earlier draft plans that may have been developed by the donors need to b updated and detailed.

Most donors will also have their own requirements for reporting and monitoring project progress. The local government system needs to be examined to see how it can be revised to meet the new requirements. With the history of corruption in many countries, various donors are concerned about financial management and transparency. The World Bank does ask that physical progress be related to expenditures but does not require earned value systems.

6.3.2 Lessons Learned

Evaluation is defined as follows:

- Did the project meet its objectives and were they the right objectives? This is necessary for both implementation and operations.
- Was the project completed on time and on budget and was the performance satisfactory? It is also necessary to determine whether the operational objectives of the project were achieved after the project is complete. For example, over time did the power plant produce the amount of power that was planned?

The evaluation process starts with the local team preparing lessons learned, which is reviewed and expanded by the international agency. In some cases, a separate evaluation unit will perform an external evaluation.

6.3.3 New Approaches

In recent years, the Aid community has recognized many of the problems presented in this analysis. The Paris Declaration on Aid Effectiveness of March 2005 called for harmonization and alignment of aid programs by all donors and participants. They called for Country Action Plans with true involvement of the country in the planning. Another tool was Pooled Financing and long range programs versus discrete projects in isolation. The development of independent monitoring calls for the development of a new paradigm which emphasizes country ownership, aid harmonization and alignment, managing for results and mutual accountability between aid donors and recipient countries. Projects to develop local capacity need to be coordinated and managed as a long term program with full local commitment. The basis of the World Bank's efforts in each country is a Country Assistance Strategy (CAS) based on a Poverty Reduction Strategy Paper prepared by the government outlining their objectives and plans. The Aid community is now working towards Collaborative Country Assistance Strategies to improve development effectiveness via collaboration. These are all excellent proposals, long overdue. The question arises on how effectively they will be implemented given the various motivations and incentives of all the actors and the capability of the countries to play a dominant role.

6.4 CONCLUSION

1. Even small International Development projects are complicated. Success depends on utilizing standard project management processes paying particular attention to meshing objectives and activities with the local stakeholders.
2. It is especially important to have a high level project champion or sponsor to support the project team and to run interference across government when necessary.
3. It is also important to have a pro-active project manager rather than a bureaucrat. Projects that usually cut across various departments require entrepreneurial behavior to make things happen.
4. Various lenders and donors and governments now recognize the many problems caused by the different processes used by different donors and action plans have been developed to try to solve those problems. The key question is whether the donors will follow through and if the governments can develop and maintain the local capacity to take charge of their development.
5. The long term results of attempts to develop local capacity in the less developed countries are not encouraging for the future. The very low level of government salaries and the opportunities for trained personnel outside of government and in some cases outside of the country usually leads to the loss of good people and after years of capacity development efforts the situation often remains unsatisfactory.

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CHAPTER 7
MANAGING TRANSNATIONAL PROJECTS

Miles Shepherd

Miles Shepherd has been involved with project management in one form or another for more than 30 years and has led a variety of projects in the United Kingdom, Eastern Europe, and Russia. His later work centered on the develop project management techniques used to decommission nuclear reactors in the United Kingdom. He works with government agencies, universities, the media, and professional societies to improve understanding of project management. He has held significant posts with the Association for Project Management (vice president and past chairman) and the International Project Management Association (past president and chairman of council).

7.1 INTRODUCTION

For the past 20 years or so, the importance of projects in the business world has evolved so much that for almost all industry sectors, projects are viewed as an essential component. In this same period, businesses have become more international, as a range of barriers has been removed or reduced. This is a normal development; as commercial organizations have grown in size and wealth, their operations have tended to extend well beyond their national boundaries. For example, raw materials have long come from a variety of countries, but we are now seeing a significant shift in production whereby complete assemblies are manufactured in remote sites, and these sites are frequently in overseas countries. Thus, it is becoming usual to find organizations conducting their normal work across much greater distances.

Similarly, once business is established across borders, it is inevitable that projects are regularly conducted across international boundaries. This process of market expansion has become widely associated with the process of globalization and, in part, it results from the changing world economy and the impact of major political organizations such as the World Bank, World Trade Organization, and the United Nations. These and other factors have combined to encourage the conduct of a new type of project—the transnational project (TNP). What emerges for the project manager (PM) is a range of interesting opportunities for new work as enterprises take on more projects across national borders.

7.1.1 Types of Projects

As the name implies, TNP projects are conducted across national boundaries. It is not sufficient for projects merely to be conducted on separate sites. The intervention of national boundary imposes some constraints on ease of travel so that it becomes either inconvenient or excessively expensive. However, other variables need to be considered, including the number of sites involved in the project and the number of organizations involved. These parameters define a number of subdivisions illustrated in Figure 7.1.

	Single company	Multiple companies
Single remote site	Type 1	Type 3
Multiple remote sites	Type 2	Type 4

FIGURE 7.1 Project topology.

Type 1 Projects. These are the simplest forms of TNP, with a single company operating on a single remote site. Only a single boundary exists between the head office and the remote site. Where the physical distance is very small, there should be relatively little difference between this type of project and normal dispersed projects. The type of project considered here will involve a greater degree of separation, which makes travel between the two sites inconvenient or excessively expensive.

Type 2 Projects. These projects are more complex, since multiple remote sites are involved. In addition to the conditions present in Type 1 projects, at least one additional site is involved, which may be in the same country as either the head office or the remote site, or in an entirely different country.

Type 3 Projects. These projects involve multiple companies operating on a single remote site, with structures that are more complex than Type 1 and 2 projects, since they involve additional head offices with a combined team operating on the remote site. Structurally, such arrangements are commercial consortiums and have a number of complexities that depend more on the commercial arrangements than the effects of distance and remoteness.

Type 4 Projects. These projects are generally the most complex since multiple companies operating on multiple remote sites present all the complexities of Type 3 projects with the added issues of further sites to consider.

7.1.2 TNP vs. Global Projects

While TNPs share some characteristics with global projects, they are not the same. Global projects are always very large and always involve many countries. Inevitably, TNPs tend to be of significant size and involve at least two countries, but they are not normally as large as the typical global project. The issues that are addressed in this chapter are not confined to those that are related to large projects. In contrast to global projects, size is not necessarily a characteristic of TNPs.

7.2 OUTLINE OF ISSUES

TNPs present a number of interesting challenges to the PM. This chapter concentrates on several major areas of interest. Culture is a difficult notion, as culture and cultural difference are at the heart of what makes TNP different from other types of projects. Cultural differences influence most areas of project management. In particular, they make the PM approach leadership in different and unique ways, because culture affects motivation and belief systems. We need to consider how TNP imposes additional calls upon the PM as a leader, not just as a manager. A key part of both leadership and management is communication, so we shall examine the additional demands that the PM must contend with in communicating within and beyond TNP. Finally, as TNPs are inevitably conducted in remote locations, some attention must be paid to physical aspects imposed by overseas working.

7.3 CULTURE

The notion of culture is difficult for those managing TNPs since it asks PMs to deal with a series of issues that concern people rather than the more technical elements to be found in the textbooks or publications such as the project management bodies of knowledge. As the team is the key to successful project delivery, it is important that it operates as effectively, efficiently, and harmoniously as possible.

In addition, TNPs have stakeholder from many countries, either as participants or more remotely as part of the affected community, so it is important to identify any factors that may have to be addressed to achieve a successful project outcome. These factors can range from simple language difficulties through contradictory contract interpretations to complex behavioral issues. It is therefore important that PMs not only understand the cultural background of their project but that they also understand how to manage in a complex cultural environment if the team is to work harmoniously and is to produce the desired outcomes. Furthermore, because the PM comes from a particular culture, this person is part of this complex environment.

To illustrate how the culture of the PM influences the cultural environment, consider the following situation: You are the manager of a Type 1 TNP and have been sent out from the head office to the remote site, which you have not visited before. You have not yet met any of the project team. When you get off the airplane, a warmly smiling woman wearing jeans and sandals is holding up a piece of paper with your name on it.

What do you think? Perhaps one of the following possibilities occurs to you:

- She must be a secretary.
- She is probably the person with whom you will have the meeting.
- It is wonderful to be welcomed so warmly.
- How dare someone meet you in such an informal outfit?
- There must be an error, because you were expecting a formal-looking gentleman.

Note that there is no correct answer to a situation like this. In this case, the woman's behavior stimulates expectations within you about her intentions toward you, or it causes you to make inferences about her and the rest of the team. If you have been honest, you may have felt one or more of the feelings in the list. What you feel is influenced by your cultural background and will be influenced by many complex factors in your education, experience, and the mores and accepted behavior in the land of your upbringing. So your culture is influencing your reactions, and possibly your actions as well.

Most PMs will encounter aspects of multicultural project teams at some stage in their career, so a brief overview of the area can assist in identifying the areas of culture that need further study. The seminal work of Hofstede (as discussed later in the chapter) has provided keys to understanding the importance of culture. A full understanding of the part culture plays in life would take many years of study to master, but there are some basic aspects that PMs can address to minimize the impact of cultural issues upon their projects.

7.3.1 Types of Culture

Culture exists at many levels and affects projects in a variety of ways. This section sets out a view of the various types of culture that the PM may encounter and offers guidance on how to approach issues of culture within TNPs.

Many definitions exist for the word *culture*. Perhaps the best known and most widely used is that of Kluckhohn (1951), who explained it thus:

> Culture consists in patterned ways of thinking, feeling and reacting, acquired and transmitted mainly by symbols, constituting the distinctive achievements of human groups, including their embodiments in artifacts: the essential core of culture consists of traditional (i.e., historically derived and selected) ideas and especially their attached values.

Other, more modern, definitions are available, but this is sufficient for our needs. The major point is that different communities have patterns for living that allow them to deal with day-to-day life in their geographic region. These patterns are conditioned by the specific experiences of the community, their environmental situation, and their belief systems such as religion, local laws, and ethics. Many other factors influence culture, including varying experiences of commonly occurring events such as language, educational systems, and family life; these patterns allow people to make sense of the world about them. Given the number of factors that influence culture, it should be clear that the PM may encounter different types of culture within a single project. The most significant are the following.

Project Culture. In the economically developed world, projects have become such a commonplace way of conducting business that they are taken for granted. People are accustomed to working via projects, and they often have direct experience of working within a project environment. Project culture has two forms: the culture that readily accepts projects as a normal way of working, and the culture of the specific project itself. The latter takes time to establish, and it is this culture that the PM should seek to shape to the benefit of the project as a whole.

Working within a project is a culture in its own right, so most people in the developed world have at least heard of projects; however, in some areas of the world, operating within a project team is foreign to the everyday experience of many individuals. In these areas, individuals have not encountered projects as a way of working, and they have little understanding of the basic techniques of project management or the behavior patterns that such work invokes. Further, they have no experience of working in such an environment, so those who have a great deal of project experience may make inappropriate assumptions about the experience level of their colleagues.

Company Culture. Large corporations are like countries in terms of the number of people they employ, the regions they encompass, and their wealth. For example, IBM annual sales of U.S. $176 billion is similar to the gross national product of Denmark, Siemens at U.S. $75 billion is much the same size as Malaysia, Honda at U.S. $55 billion is similar to New Zealand, and Shell at U.S. $105 billion is similar to Israel. Many corporations, and not just the very largest multinational ones, develop a culture of their own. This manifests itself in expressions such as "the way we do things here," "company style," or similar expressions, which indicate a particular pattern that is characteristic of the corporation. This is equivalent to a company culture, and people joining the company are taught this pattern.

Where projects are carried out in a single cultural environment, all participants have an understanding of how they are expected to behave. Contrast this with a project carried out by several corporations, where participants may come from divergent company cultures and patterns of behavior, and expectations may differ sharply.

National Culture. This type of culture is probably the best known, since most people have a clear perception of their own national identity and recognize that people from other countries are somehow different. Where people have different local conditions such as climate, physical, legal, ethical, and educational environments, there inevitably exist differences in their underlying belief patterns and values. We generally call such differences *national cultures*.

7.3.2 Hofstede's Dimensions

The major reference work on national culture and its implications was carried out by cultural researcher and professor Geert Hofstede. He based his research on data obtained initially from surveys carried out in various countries, some 50 in number, in 1966. These data were supplemented by additional surveys, but the main research was carried out between 1973 and 1978. The output was a major academic textbook, but this has been supplemented by a more accessible version (see "Further Readings").

Hofstede identified five dimensions of national culture, as illustrated in Table 7.1. Each dimension has two extremes, and Hofstede positioned each country between these two extremes, by means of scores from his surveys. Thus, each country has a profile of five values. The scores for these original dimensions and the extensions carried out later for some countries are listed in the textbook. It is not necessary to refer to the scores, but the rankings are significant and the relative positions of countries can offer some insight into the major cultural traits that may be useful to the PM. The profile for each culture can provide insight into the likely attitude and behavior of people from that country. These profiles can also indicate key traits such as acceptance of uncertainty and working styles.

TABLE 7.1 Hofstede's Dimensions

Dimension	One extreme	Other extreme
Identity	Collectivism	Individualism
Hierarchy	Large power distance	Small power distance
Gender	Femininity	Masculinity
Truth	Strong uncertainty avoidance	Weak uncertainty avoidance
Virtue	Long-term orientation	Short-term orientation

Some important aspects of the data should be remembered. First, the data is nearly half a century old. Some of the countries that participated in the original surveys have changed substantially in the period since the data were collected (for example, Yugoslavia). Also, some important countries were not covered in the original surveys (such as China). It should be noted that countries do not behave in the same way as individuals from a particular region. Despite these issues, there is general agreement on the implications for intercultural communication. Thus, based on the extremes identified by Hofstede, misattribution of culture-based behaviors can occur, as shown in Table 7.2.

Hofstede translated the behaviors into factors, which are described in the following sections. It is important to remember that individuals do not uniformly display the national characteristics described by Hofstede. Rather, there is a tendency towards the typical national culture. The issue for the PM is to understand how these tendencies affect the behavior of individuals in the project team so that the best team performance can be achieved. This understanding is a matter of overcoming barriers to intercultural communication.

Power Distance. This dimension deals with the basic inequality of the human condition. Note that inequality does not refer to oppression, although that might be institutionalized and thus be cultural in orientation. Power distance is more a measure of the interpersonal power or influence exerted by an individual. Typically, in an industrial situation, it is the difference between influence of the boss (B) and the subordinate (S) as perceived by the less powerful of the two.

Individualism. This dimension is bipolar; the extremes as we have seen are individualism, where the ties between the individual and the group are loose. Each person is expected to look after himself or herself. Compare this with the collectivist society, where the main loyalty lies to the group or

TABLE 7.2 Misattributions (after Hofstede, et al.)

Listener who is culturally more...	...can misperceive culture-based behavior of foreigners as...
Collectivist	Insulting, stressed, heartless, rude
Individualist	Dishonest, corrupt
Large power distance oriented	Disrespectful, improper, rude
Small power distance oriented	Bossy, rigid (of high-status persons) Servile, cowardly (of low-status persons)
Feminine	Aggressive, showing off (of men) Playing "baby doll" (of women)
Masculine	Weak (of men), unfeminine (of women)
Strong uncertainty avoiding	Unprincipled, amoral
Strong uncertainty avoiding	Rigid, paranoid
Long-term oriented	Irresponsible, throwing money away
Short-term oriented	Stingy, cold

the state. People are integrated into strong, cohesive in-groups that offer their protection in return for loyalty.

Masculinity. Again, this is a bipolar dimension where the social gender roles determine the orientation. In masculine orientation, the roles are clearly distinct and the men are robust, assertive, and success oriented. In feminine societies, the social roles overlap. Both men and women are modest, tender, and concerned with the quality of life.

Uncertainty Avoidance. This dimension measures the extent to which members of a culture feel threatened by uncertainty or unknown situations. Note that uncertainty avoidance is not the same as risk avoidance since risks can, as we know, be identified and analyzed. Thus, risks are to an extent quantified and so cease to be unknown.

Long-Term Orientation. This dimension was not one of those originally identified in Hofstede's initial work. It emerged from follow-up work in China. Long-term orientation fosters the virtue of future reward rather than short-term orientation, which fosters the virtues related to the past and to tradition.

7.3.3 Barriers to Intercultural Communication

The following may be considered barriers to intercultural communication:

- **Spoken language** Language is not simply the set of words (vocabulary) and rules for their use (grammar), and this presents interpretation problems. The social context and cultural aspects are so ingrained in native speakers that they are rarely considered. We will consider this aspect further under the topic of communication.
- **Nonverbal communication** So-called body language conveys a great deal of information so that unconscious gestures and mannerisms can alter the sense of verbal communications or send contradictory messages. However, there is good evidence to show that the interpretation of gestures, posture, facial expression, and so forth can be interpreted in many different ways. The cultural context is again critical.
- **Stereotypes** There is a natural but unhelpful tendency to try to fit strangers into patterns based on our previous experience. This can be likened to seeing what we want to see, rather than what is actually there.
- **Judgmental attitudes** Similar to the previous barrier, the tendency is to evaluate behavior from other cultures as either good or bad, compared to our own culture.
- **Stress** The final barrier is the stress that typically accompanies intercultural exchanges.

In extreme cases, where two or more people from different cultures meet and misunderstanding arises, it can escalate into what is known as *culture shock*. Culture shock is interpreted differently by various scholars, but the result generally shows a number of symptoms:

- Familiar clues about how to behave are missing or have different meanings.
- Values of the visitor are not respected by the host.
- The visitor feels disoriented, anxious, depressed, or just hostile.
- The visitor is dissatisfied with the new ways.
- Social skills that used to be effective are no longer considered useful.

A number of escalating stages are often involved in culture shock:

1. Honeymoon period, where the newly arrived individual experiences the curiosity and excitement of a tourist but his or her identity is rooted back home.
2. Disorientation, where almost everything familiar disintegrates and the individual is overwhelmed by the requirements of the new culture, resulting in disorientation, self blame, and a sense of inadequacy.

3. Irritability and hostility, where the disorientation turns to resentment at the new culture, which is blamed for causing the difficulties.
4. Adjustment and integration, which involves the adoption of new cues and an increased ability to function in the new culture.
5. Biculturalism, the final stage, where the new arrival feels comfortable in the new culture and is able to move easily between the two cultures.

Whichever type of culture you encounter, the key is to educate the project team and as many key stakeholders as necessary. This education should take the form of a three-step plan:

1. *Awareness.* Make people aware that they differ from many foreigners in their social behavior and assumptions.
2. *Knowledge.* Help people to know their differences from people from various parts of the world.
3. *Skills.* Teach people the skills they need to communicate effectively with these various foreigners.

7.4 LEADERSHIP

In the special circumstances of TNPs, teams are often isolated from their families, friends, and wider support networks, leadership of the project becomes even more important than in normal projects. Project and team managers need to address all the normal aspects of team building, motivation, and management if they are to lead successful projects. Leadership goes well beyond the mechanical human resources management (HRM) factors covered in textbooks and covers what the PM needs to do to gain the support and commitment of the project team. Nevertheless, HRM is an important topic and due attention needs to be paid to it, but leadership is particularly significant for TNPs, where matters of morale and cooperation can have a disproportionate impact.

Many theories exist about leadership, including one that leadership cannot be learned. While this may be true, military academies the world over spend a great deal of effort on developing the leadership potential of their students, so something can be learned. In this section, we examine those specific aspects that the PM can influence. Some of these aspects include an understanding of simple leadership theory, individual leadership style, and motivation aspects.

7.4.1 Leadership Theory

One of the most basic leadership theories was developed by John Adair, who found that leaders needed to pay specific attention to three areas of need for team members. These areas are illustrated in Figure 7.2.

These areas are interrelated and overlap at times. Their importance and influence also varies, but they are interdependent, so the leader must watch all three.

Maintenance of the Aim. For PMs, this aspect is the most natural, since it relates to the overall objectives of the project. In principle, this is no different from normal management of projects, where a clear goal and objectives are set and the appropriate organization is put in place.

Team Needs. These needs relate to the way the whole team interacts, supports one another, shares responsibility, and communicates. In addition to the normal role of the PM, this area of TNP demands that the PM do the following:

- Act as champion for the project in all its relations
- Set the general direction of the project through collaboration with all the project stakeholders
- Identify issues likely to impact on the project and work with the team to deal with these issues

Individual Needs. Since the team is made up of individuals, looking after their needs must be seen as a central concern of the leader. In TNP, this aspect is even more significant than normal since

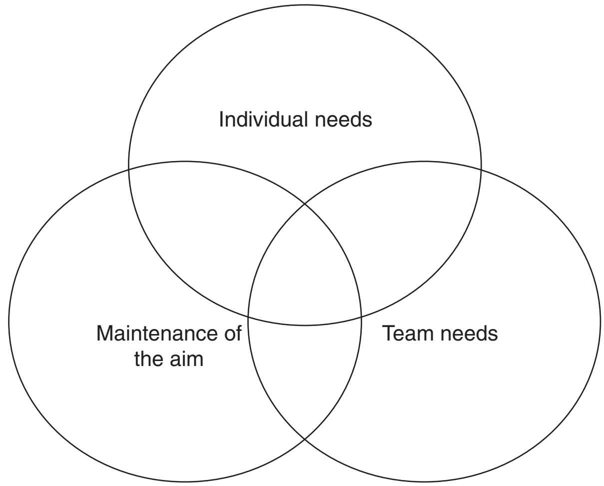

FIGURE 7.2 Adair's leadership model.

teams may be isolated from their normal social support networks. Just how much support is needed will vary from person to person, but the effective leader will need to identify anything that affects the performance of the individual members of the team.

Adair's model is seen as rather basic, but it has formed the core of leadership development for several well-known military colleges. For the busy TNP manager, though, it provides a sound foundation for active management of the team.

7.4.2 Support Networks

The basic principles of leadership are universal, but their application is affected by cultural differences and by the physical circumstances of the project. As indicated earlier, individual social support networks of friends, colleagues, and family are usually absent in TNPs, so individuals may feel isolated, lonely, and apprehensive, feelings that can carry over into the working and social environments of the remote team. In effective teams, this network is replaced by that of the team itself as individuals bond and coalesce as a team. The TNP manager cannot allow this bonding to develop slowly, and must use team-building techniques to establish the team as an effective unit as soon as possible. This is particularly important in Types 3 and 4 projects, where team members will have had no opportunity to meet before deployment. Team training and development prior to deployment can be useful opportunities to introduce individuals and to begin the process of building strong interpersonal relationships. If such opportunities are not available, TNP managers should ensure that a full team meeting takes place as soon as possible so that the team can be fully briefed on the following:

- The purpose of the project
- What support is available locally and from home bases
- How they can contact family and friends (mail, e-mail, video conference links, etc.)
- Logistics arrangements

7.4.3 Conflict

TNPs have a tendency to magnify many behavioral aspects, since few other talking points exist. Thus, personal behavior, as well as differences of opinion over technical matters, ideas, or project processes can all cause conflict to arise. It is important to remember that some divergence of view is to be expected, and in a healthy and effective team, this is an opportunity to discuss and learn from the differences in experience and values. However, where personal issues emerge, it is important that they be dealt with quickly before they escalate and cause serious disruption.

The TNP manager will need to follow the normal steps in conflict resolution, such as the following:

1. Establish the facts of the situation to determine the real cause of the conflict.
2. Negotiate to remove the causes, both real and imagined.
3. Seek to resolve the conflict through team consultation.

In the event that the TNP manager is unable to resolve such issues, specialist counseling may be needed. Should these prove ineffective or unavailable, replacement of troublesome individuals will need to be considered.

7.4.4 Team Motivation

The ability of the TNP manager to motivate the team to work effectively is a crucial skill. Motivation is regarded as a system of factors that interact to influence the behavior of the individual, and several theories can be used to explain such factors. One of the best known is Maslow's hierarchy of needs, which is illustrated in Figure 7.3.

Maslow determined that the *primary needs* for all individuals are their basic physiological well-being and their safety and security. Once these are satisfied, they become more concerned about their *secondary needs* relating to their relationships, status, or esteem and their self-actualization or fulfillment. It is important to note that the lower level needs must be satisfied before the higher level ones become important.

In the TNP, the primary needs are dealt with as part of the logical setup of the project, while the relationships level is a key part of team-building. The esteem needs of individuals should be satisfied through the work that they perform and through acceptance as part of the team. The highest level depends to some extent on the satisfaction derived from membership of a successful team, but it also depends on achievement of personal goals; these may be related to personal development targets, rewards, or perhaps just the freedom that good performance brings so that individuals are able to express themselves through their work and membership of the team. Maslow characterized these secondary needs as follows:

- They are dependent on experience.
- They are variable in that they differ from person to person in both kind and strength.
- They are variable over time and can change.
- They are emotional rather than physical.
- Individuals frequently do not consciously understand their needs.
- They can strongly influence how individuals behave.

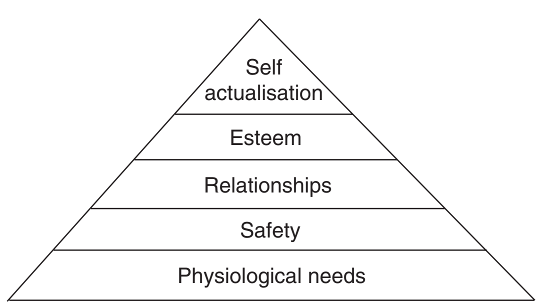

FIGURE 7.3 Maslow's hierarchy of needs.

Application of Maslow's concepts can help the TNP manager to influence the motivation of individuals by applying appropriate rewards to satisfy individual needs. However, priority must be given to the primary needs as these are the most basic necessary to influence individual motivation.

7.4.5 Leadership Style

The personal style of the TNP manager has a considerable influence on many aspects of leadership. Primarily, the TNP manager must be seen to act fairly and in the reasonable interests of those he or she leads, so it is important to develop an understanding of the factors that motivate individual team members. TNP managers need to develop their own leadership style, and that style should be a natural one, or else team members are likely to feel that they are in an artificial environment where they are being manipulated rather than led. It is important that the manager be sensitive to cultural nuances, since what influences individuals from one cultural background may not satisfy individuals from other backgrounds. For instance, some cultural groups (such as Germanic nationalities) are strongly averse to uncertainty and so do not operate effectively in conditions where plans are necessarily fluid, while others (such as the French) thrive in such situations. Where the team is culturally mixed, it is important that the manager understand how power/distance relations come into play. Detailed information on such topics can be found on Geert Hofstede's Web site (www.geert-hofstede.com).

Leadership plays a significant part in all projects, but the TNP presents some additional issues that can be addressed by a sound understanding of the need to build social networks and motivate team members. Techniques of team building, conflict resolution, and motivation are particularly important for the TNP manager.

7.5 COMMUNICATIONS

It is well known that communications are critical to the success of any project: the PM must pass on instructions to team members and in turn receive reports concerning project performance. Similarly, the PM must report project performance to the home office, report on any issues that arise, and negotiate resources. Further, the PM needs to communicate effectively with a number of stakeholders, keeping them informed of progress, briefing them on relevant issues, and ensuring their continued support. Anything that undermines effective communications is a serious matter requiring rapid resolution. This section outlines some of the main communication issues and highlights methods to improve the effectiveness of intercultural communications.

Figure 7.4 illustrates a general model of the communication process. The sender requires a set of symbols to formulate the message and a set of rules for the use of the symbols. In most cases, these take the form of natural language and the grammar and syntax of speech. Having formulated a message, it must be transmitted through a channel, perhaps a telephone line or air in the case of speech or electronic means for other messages. The message is then transmitted to the receiver who uses a set of symbols and rules for their use to decode the message.

For the message to be transmitted effectively, the sets of symbols used by the sender and the receiver must be similar and the rules for use of the symbols must also be a close approximation. They can never be absolutely identical, since individuals differ in their understanding of language and its usage. Effectively, this means that even where the same native language is used, messages may be misinterpreted and so some feedback mechanism is needed to verify that the message received is the one that was sent and that it has been interpreted as intended. The model shows that there are many possible ways for misinterpretation to occur. Some of the issues for TNP are listed in the following sections.

7.5.1 Language

If sender and receiver have different sets of symbols, it is unlikely that effective communications can take place because they will be unable to attribute meaning to the symbols. Usually this means that the sender and receiver need to speak the same language, either as mother tongue or they must have a second language in common. Given the way culture develops, it should come as no surprise

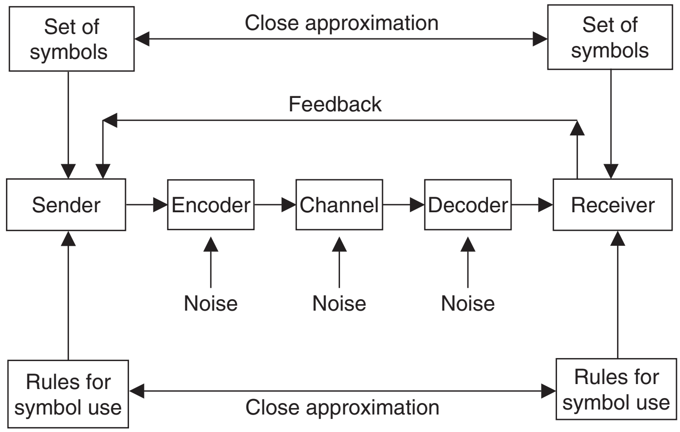

FIGURE 7.4 Communications paradigm.

that even those sharing a mother tongue will have differences in language interpretation. So, for instance, French-speaking Canadians are not always comprehensible to European French speakers, and there are significant differences between British and American forms of English. It is not just that different words are used for commonplace items (for instance trunk and boot, hood and bonnet), but some words have specific meaning in one culture and a different meaning in another. As an example, consider the following situation: A U.S. team leader is preparing for a meeting with project stakeholders when a British team member asks whether to bring up a contentious issue at the meeting. The team leader instructs the team member to "table the idea." At the meeting, the team member brings up the issue to the displeasure of the team leader.

What has occurred here is a mismatch of symbols. For the U.S. team leader, *tabling* something means to put the item on the table and not bring it out, while for the British team member, *tabling* something means just the opposite—putting something on the table means to place the issue where everyone can see it. Had the team leader instead said "Shelve this item," the team member might have understood. Many other language pitfalls lie in wait for the unwary, so it is important to make full use of the feedback loop in the communications model.

Other language issues require interaction between those who do not share a common language. In a situation such as this, it is common to use translators either to prepare documents or to interpret formal conversations at meetings or less formal discussion. Generally speaking, the need for translation adds time to project processes and allowance must be made for the additional time needed.

Errors in translation can be very costly, so some checks on translation are essential, at least until the ability of the translators has been verified. It is prudent to double-translate key documents to ensure that the meaning of the original document has been adequately captured. This should be regarded as an absolute requirement for all contractual documents originated by the project team.

Use of the two main forms of translation for spoken communication needs careful consideration. Simultaneous translation, as used at major international conferences or agencies, is expensive and frequently requires that the interpreters be supplied with advance copies of papers so that they can prepare for their task. However, such translation is immediate, usually accurate, and loses little or no time in meetings. On the other hand, interpreters tire quickly and performance deteriorates with tiredness. A less resource-intensive option is consecutive translation, where the speaker pauses to allow the interpreter to translate. This approach adds time to meetings since everything needs to be said twice, once in the original language and once in the translated tongue. But it does allow more flexibility and can be set up much more quickly than simultaneous translation. Consecutive translation requires a certain amount of practice since those participating in the conversation need to pause from time to time. One of the advantages of this method of interpretation is that it allows speakers time to think; so it is very useful when negotiating or when complex topics need to be discussed.

7.5.2 Nonverbal Communication

Language is not just verbal. It has been estimated that 55 percent of all communication is nonverbal. Posture, facial expression and tone of voice all contribute the way a message is transmitted; these factors contribute substantially to the meaning of the message.

In some communications such as e-mail, additional messages are lost. Even when the communication medium allows nonverbal communications, such as videoconferences, the nuances may have different meanings in different cultures and the attitude of the correspondent may be misinterpreted or missed altogether.

Just as culture affects spoken and written language, it also influences nonverbal communication. The effects can be obvious, such as different ways of indicating agreement: in Western countries, agreement is often conveyed by means of a nod and disagreement by the shake of the head. However, in some regions, the meanings are reversed so that agreement is indicated by the shake of the head. To complicate matters further, in some cultures, a nod means simply “I have heard what you say” and does not indicate agreement or even that the words have been understood. In some Eastern cultures, nodding is a sign of politeness and conveys nothing beyond indicating that the listener has heard what has been said. Some interpretations of body language are shown in Table 7.3.

TABLE 7.3 Body Language Interpretation

Nonverbal behavior	Western interpretation	Alternative interpretations
Brisk, erect walk	Confidence	
Standing with hands on hips	Readiness, aggression	
Sitting with legs crossed, foot kicking slightly	Boredom	Deeply insulting in Middle Eastern cultures if soles of feet are visible
Sitting, legs apart	Open, relaxed	
Arms crossed on chest	Defensiveness	
Walking with hands in pockets, shoulders hunched	Dejection	
Hand to cheek	Evaluation, thinking	
Touching, slightly rubbing nose	Rejection, doubt, lying	Considered rude in Eastern countries
Rubbing the eye	Doubt, disbelief	
Hands clasped behind back	Self control	Anger, frustration, apprehension
Locked or crossed ankles	Apprehension	Aggression
Head resting in hand, eyes downcast	Boredom	
Rubbing hands	Anticipation	
Sitting with hands clasped behind head, legs crossed	Confidence, superiority	Rude behavior in business meetings
Open palm	Sincerity, openness, innocence	
Pinching bridge of nose, eyes closed	Negative evaluation	
Tapping or drumming fingers	Impatience	
Patting/fondling hair	Lack of self-confidence; insecurity	Lack of respect for listeners
Tilted head	Interest	
Stroking chin	Trying to make a decision	Indecision
Looking down, face turned away	Disbelief	Lying

Even with the small number of differences in interpretation shown in Table 7.3, it is clear that it is all too easy to misinterpret nonverbal communications or give offence in some cultural circumstances. Information on such matters is generally available on the Internet at sites such as those listed in the “Web References” section at the end of this chapter.

7.5.3 Communications Technology

One of the major barriers to effective communication is the channel itself. In countries with developed economies, many communications carriers such as high-speed networks and comprehensive mobile phone networks are taken for granted. In many countries such facilities are available only in major cities and sometimes not even there, thus inhibiting where and how people can communicate effectively. In some countries, such as India, high-speed network access is very limited. Similarly, some countries are concerned about what they perceive as misuse of technology and may disable or make it difficult to use some features such as external e-mail, Internet access, or direct telephone dialing.

Although modern information and communication technology has revolutionized the ability of dispersed teams to communicate, a number of problems need to be considered within the TNP environment. For instance, worldwide adoption of desktop technology standards can be inconsistent. It is not uncommon to find older standards still in business use—for example, in South America, a screen resolution of 800×600 is common compared with 1024×768 used in the United States and Europe. This can lead to reduced productivity by having to use the lowest common standard for collaboration.

7.6 PHYSICAL ASPECTS

TNPs by definition involve remote sites, so these sites must be self-sufficient in terms of logistics and administration. If something has not been supplied as part of the initial setup of the remote site, it will have to be obtained from local resources or sent out from the home office with consequent delays. Processes will need to be developed to ensure effective operations and to ensure that the physiological needs of the team are satisfied.

7.6.1 Time Zones

Unlike traditional colocated teams, TNP teams frequently work across time zones. This means that parts of the team will be working at different times, so arranging virtual meetings or conferences can be frustrating when trying to ensure that everyone attends during working hours. Time zone differences tend to cause confusion over scheduled contacts or reporting deadlines, particularly where the time difference is not a whole number of hours. A small sample of time zones is illustrated in Table 7.4.

TABLE 7.4 Selection of Time Differences

Location	Country	GMT Difference (Hours)	Working week
San Francisco	United States	–8	Monday–Friday
Phoenix, Arizona	United States	–7	Monday–Friday
London	United Kingdom	0	Monday–Friday
Tehran	Iran	$+3^1/_2$	Sunday–Thursday
Abu Dhabi	UAE	+4	Sunday–Thursday
Delhi	India	$+5^1/_2$	Monday–Saturday
Katmandu	Nepal	$+5^3/_4$	Monday–Saturday
Adelaide	Australia	$+9^1/_2$	Monday–Saturday

Arranging a video conference for 9:00 A.M. on September 20 for a client in Arizona, when the project home office is in London and with remote teams in Delhi and Adelaide, would have the following time differences:

Site	Location	Time	Date
Client	Phoenix	9:00 A.M.	September 20
Home Office	London	4:00 P.M.	September 20
Team 1	Delhi	9:30 P.M.	September 20
Team 2	Adelaide	1:30 A.M.	September 21

This situation is very common, and many teams overcome the issue of communications across time zones by rotating the base location. Under this arrangement, each location takes it in turn to fix the start time so no site is consistently making contact in unsocial hours. It is important to be sensitive to the remote site situation, how such timings fit in with the local culture and working abilities. Another possible solution is to allow participants to take calls at home, though not all countries have the infrastructure to support this type of operation. However, many countries, such as India, offer no viable alternatives for employees other than to work at the main office to attend meetings.

These problems are exacerbated by some locations that use different working days so that teams working in Europe and the Middle East will have different days for their weekends. Similarly, much time can be lost over public holidays, especially Christmas and New Year for American and European countries where Roman and Orthodox dates are used. Thus Christmas in most European countries is fixed for December 25 but for countries, where the Orthodox religious holidays are celebrated (for example, Greece, Russia, and Ukraine), the Christmas holiday season might stretch over three or four weeks. The TNP manager therefore needs to understand the timing and number of public holidays in the remote locations and make allowances for these inconsistencies.

Another aspect of time zones is the effect on human physiology produced by rapid changes. This effect, so-called jet lag, needs to be considered, especially where personnel from the home office are visiting the remote site. Lack of concentration and disruption to sleep patterns can cause problems, especially if the visitor is required to make decisions or to attend meetings shortly after arrival.

Although e-mail has been widely available for many years, traditional practices may need modifying to ensure effectiveness in a TNP environment. E-mail is usually reliable in terms of delivery, but a significant proportion of messages never arrive. Unlike traditional teams where a follow-up can be made in person or through a phone call, time zone differences may make this difficult or impossible and so other techniques are needed. A “read receipt” can enable the sender to tell when the recipient has opened e-mail. This has significance for distributed teams where doubt may exist about whether the message has been read and when action could start. It is usually necessary to establish procedures or conventions to cover such situations to avoid confusion.

7.6.2 Location Issues

As part of logistic planning, consideration of remote site locations is an important factor. Staff at the remote site will need appropriate facilities for work. The logistics team will need to be aware of all the usual criteria for selecting office accommodation and specifically will need to make sure that offices are physically secure. Other important criteria include reliable electricity supply, adequate heating and lighting, and electronic security.

Unless the remote site is situated in a city where hotel accommodation is readily available, it will be necessary to arrange suitable living accommodation for the team. In some overseas states, foreigners are accommodated in compounds so that contact with the local population is minimized. This has the advantage that nonlocal team members are likely to live in reasonably secure locations and are likely to be located close together, which is convenient for communications and transport purposes. Where local accommodation is rented for team members, some central method should be established to vet the property for suitability and price. Newly arrived team members may not have the necessary experience to negotiate reasonable rates or to find suitable property. Similarly, it may be useful to establish contract arrangements for domestic services such as cleaning and laundry services, catering, and other services.

All staff members need to be fully briefed on local conditions, culture, and behavior so that they do not inadvertently give offence to the local population and are aware of special circumstances in the remote location. Particular attention should be paid to personal security, especially in areas of unrest. Security briefings must include, as a minimum, the following:

- Local political situation
- Risks to personal safety
- Collection and transportation arrangements on arrival
- Travel security from point of arrival to TNP secure locations
- Security arrangements at the remote site
- Any local legal requirements for registration

Additional briefings on matters of health and safety should be carried out as circumstances dictate. Advice from home government travel, trade, or diplomatic sources is readily available either in the form of briefing papers or online. Typical matters for briefing include the following:

- Inoculations and vaccinations needed
- Health documentation requirements
- Access arrangements for local medical services (doctors and dentists)
- Special circumstances (dangerous plants, insects, and animals)
- Drinking water restrictions
- Availability of home language–speaking doctors
- Medical evacuation procedure
- Availability of medication (such as insulin or blood supplies)
- Other differences in standards between local and home locations

Should the remote site be located in a volatile area, some consideration should be given to secure means of communication with the home base. E-mail is not secure in any country in the world unless military or diplomatic channels are used and normal telephones (including mobile or cell phones) are regularly monitored. For reliability, it may be necessary to ensure that phone links are independent of local suppliers, so satellite links or radio may be needed.

7.6.3 Other Issues

Experienced TNP managers attend to a number of other issues relating to motivation and general team welfare. These factors depend on the local situation, but isolated teams often need help in managing their off-duty time. It is all too easy to establish a pattern of long working hours whereby individuals remain in the office long after they cease to do productive work. It is important that individuals take proper rest to avoid burnout and it is up to the TNP manager to look out for the telltale signs of degradation of team performance. Notable signs include increased irritability, deterioration in output quality, and unexplained changes in individual behavior. Where such signs are detected, the TNP manager should address issues of workload, scheduling, and staffing levels.

Staff deployed to remote sites frequently do not take adequate time off from normal duties. Where staff are reluctant to make constructive use of their down time, arrangements should be put in hand to fill the time for them. Team-building activities such as barbeques, personal development sessions, sports and fitness training are all useful activities, while home-language films and access to home-language radio and TV are also useful ways to maintain broad interest. Failure to ensure that staff remain properly occupied in their time off can result in health, morale, and motivational problems that impact on overall project effectiveness and lead to burnout.

7.7 CONCLUSION

TNPs are becoming more common and of greater significance to many corporations. We have looked at the major differences between TNPs and other types of project: while project management practices remain largely universal, the nature of the TNP magnifies some aspects of practice, so the TNP manager needs to focus special attention on some of the techniques, in addition to the normal planning and management of the project. In particular, the impact of national culture and cultural differences on the project and the team is the most important of these factors.

One important area that remains constant is that of ethics. In some remote sites, business practices are very different from those in the developed economies, and the TNP manager needs to be vigilant in abiding by the norms of ethical project behavior. Finally, it is clear that TNP provide a considerable challenge to the experienced PM, and there can be no doubt that the rewards are also considerable, in terms of job satisfaction, technical development, and opportunities to travel, at the least.

7.8 FURTHER READINGS

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7.9 WEB REFERENCES

ITIM International. “Geert Hofstede Cultural Dimensions.” www.geert-hofstede.com. Accessed December 1, 2006. This site provides a wide range of information on intercultural communication. It has tools to allow comparison of cultures within teams and overviews of some implications of Hofstede’s cultural profiles.

Executive Planet. “Main Page.” www.executiveplanet.com. Accessed December 4, 2006. This site provides guidance on business etiquette in 35 countries, mostly countries with well developed economies.

Many other sites provide specialist regional information and some government Web sites provide information about doing business in overseas locations.

CHAPTER 8
MANAGING PROJECTS IN HEALTH SYSTEMS

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Health systems, whether private entities such as the University of Pittsburgh Medical Center (www.upmc.com) or public-sector entities such as the Pennsylvania Department of Health (www.dsf.health.state.pa.us/health/site/default.asp), are replete with a great variety of projects, each of which must be well-managed if it is to succeed. Projects in these settings are undertaken to achieve a specific health care purpose such as projects in cancer care, cardiac rehabilitation, geriatrics, seatbelt use, healthier eating, or safe sex practices. Still other projects may serve a management purpose such as projects to design and equip a laboratory, train staff in a new technology, or develop a new billing system.

8.1 KEY DEFINITIONS AND CONCEPTS

This chapter presents an integrative model of managing projects in health settings. The model shown in Figure 8.1 forms the outline of much of this chapter's content. Before discussing the model, however, it will be useful to establish some key definitions and concepts about projects.

Projects can be defined as *groups of people and other resources formally associated with each other through intentionally designed patterns of relationships in order to pursue some pre-established results.* Typically, projects are embedded within larger organizational homes, including health systems, health departments, hospitals, health plans, community-based service programs or agencies, or long-term care organizations.

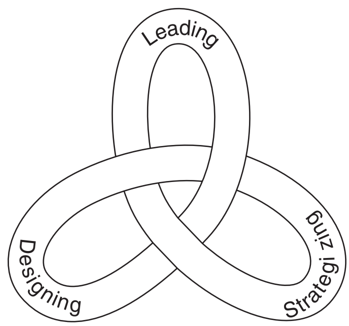

FIGURE 8.1 The core activities of managing projects (Adapted from *Managing Health Programs and Projects* with permission of John Wiley & Sons, Inc.)

Unlike traditional organizations, which are usually considered to be permanent entities with indeterminate futures, projects have predetermined life cycles (Frame 2003). The duration of a project is generally scheduled at its beginning, although some run for longer or shorter durations than originally planned because of changing circumstances. Projects have specific beginning and ending points.

Figure 8.2 graphically depicts the life cycle for a project intended to conduct diabetes screenings at an annual health fair. The curve reflects the consumption of human, financial, and material resources during the life cycle of the project. A gradual build-up of activity during which time arrangements are made for the conduct of the screenings precedes the peek of activity when the actual conduct of the screenings occurs. The peak is followed immediately by the project's conclusion and termination.

8.1.1 Considering Projects as Logic Models

In health systems and in many other locations where projects are undertaken, a useful way to get a clear picture of what a project is and does—or is intended to do—is to think of it as a *theory* (Patton 1997; Weiss 1998) or *hypothesis*. Like all theories, the theory of a project is simply a plausible, sensible model of how it is supposed to work (Rogers et al. 2000).

The way a project is intended to work can be described as a theory or hypothesis by developing a series of *if, then* statements about the project. For example, a particular project can be characterized as follows: *If* resources a, b, and c are assembled; and *then* processed by doing m, n, and o with the resources; and *if* the processing is done well, *then* the results will be x, y, and z.

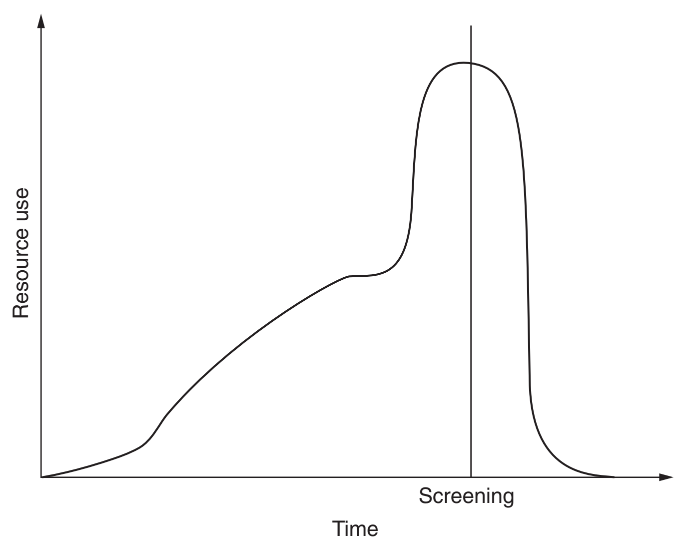

FIGURE 8.2 A project's life cycle (Adapted from *Managing Health Programs and Projects* with permission of John Wiley & Sons, Inc.)

Using its underlying theory or hypothesis as a guideline, any project can be described in terms of the inputs available for it to utilize, the processes it undertakes with the resources, and the results it achieves by processing the resources.

Implicit in the hypothesis or theory of a project is its underlying rationale or logic (Renger and Titcomb 2002). In fact, for any project, it is possible to draw a *logic model* of how it is supposed to work (W.K. Kellogg Foundation 2001). A logic model presents a schematic picture of the relationships among the inputs or resources available to a project, the processes undertaken with the inputs, and the results the program or project is intended to achieve. Logic models provide templates of how projects are intended to work. Figure 8.3 depicts a basic logic model template for projects. This template shows that inputs/resources are processed in attempting to accomplish the desired results established for the project in the form of outputs, outcomes, and ultimately its impact.

A project's desired impact stems from its mission or central purpose. In effect, the degree to which a project accomplishes its central purpose determines its impact, the ultimate change that a project causes to occur. For example, the San Francisco Immunization Coalition (www.sfimmunization.org) is a project comprising diverse public and private members whose mission is "to achieve and maintain full immunization protection for each child and adult in San Francisco in order to promote community health and prevent the spread of vaccine-preventable diseases" (San Francisco Immunization Coalition, 2007). Accomplishing its mission fully would mean the project's impact would have every person in San Francisco fully immunized, and the community would enjoy improved health.

Desired impacts are important expressions of what projects are intended to accomplish, although they are usually too general to guide a project's operation completely. Thus, concrete statements of desired outputs and outcomes are very important in project operation. Desired outputs pertain to the direct results of a project's operation and are often expressed in terms of types and quantities of services provided. Desired outcomes are expressions of changes in the clients served by a project or changes in the operation of the project itself. For example, outcomes can reflect changes in the behavior, knowledge, health status, or level of functioning caused in the project's clients. Outcomes can also reflect changes in some aspect of the project's resources and processes, such as establishing a desired outcome to attain a level of quality consistent with best practice guidelines, or treating all clients in a culturally sensitive manner.

Desired outputs and outcomes should, to the extent possible, be expressed in concrete and specific terms. This means they should be quantifiable and related to a time frame. They also should be realistic, achievable, and understandable to those responsible for accomplishing desired outputs and outcomes. In Figure 8.3, a feedback loop from desired results to inputs/resources and processes indicates that adjustments will likely be needed in an ongoing project's inputs/resources and processes.

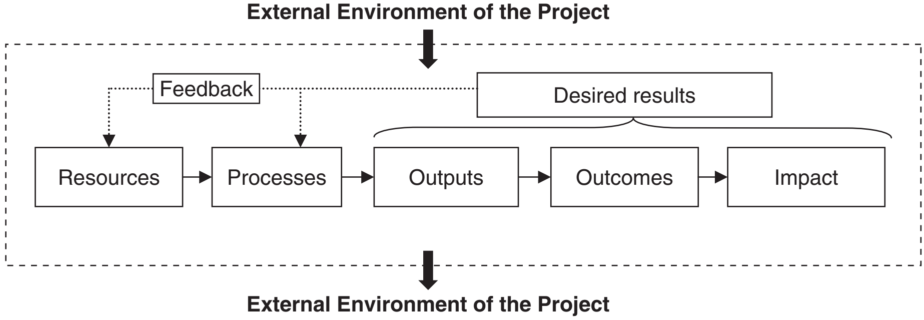

FIGURE 8.3 Logic model template for projects (Adapted from *Managing Health Programs and Projects* with permission of John Wiley & Sons, Inc.)

Figure 8.3 shows the project existing within an external environment that includes many variables that can influence the project's performance. These are illustrated by the arrow that flows from the environment into the project's logic model. These external variables include everything from the cultural milieu of the organization or community in which the project is undertaken, to economic conditions, the state of health of the population the project might serve, housing patterns, demographic patterns, political environment, background and experiences of project participants, media influence, public policies, and the priorities and resources of the larger organization in which a project is embedded.

External variables can influence almost everything about a project, including whom it seeks to serve, the extent of their needs for the project's services, the resources available to the project, the quality of its staff and volunteers, how smoothly implementation occurs, and the pace at which results are seen. Projects do not sit in isolation, somehow apart from their external environments. All projects are affected by and affect their external environments.

The results of a project flow out into its external environment, as shown in Figure 8.3 by the arrow that flows outward into the external environment. This arrow means that the outputs, outcomes, and impact of a project flow outward and affect the individuals and populations that it serves.

Utilizing a project's logic model permits project management to be defined as *the activities through which the desired outputs, outcomes, and impact of a project are established and pursued through various processes utilizing human and other resources.* A project's logic model also allows us to see that its manager is responsible for the following:

- Establishing the project's desired outputs, outcomes, and impact
- Assembling the necessary inputs and resources to achieve the desired results
- Determining the processes necessary to accomplish the desired results and ensuring that the processes are implemented effectively and efficiently
- Performing the steps above while analyzing variables in the project's external environment, assessing their importance and relevance, and responding to them appropriately

The concept of project logic models is useful as we consider how projects are managed.

8.2 THE CORE ACTIVITIES IN PROJECT MANAGEMENT

All effective project managers engage in three core activities as they manage their projects: *strategizing, designing*, and *leading* (Zuckerman and Dowling 1997). In performing these core activities, managers also engage in other activities that facilitate and support accomplishment of the core activities. These facilitative activities include *decision-making* and *communicating,* which are important supports for each of the core activities of strategizing, designing, and leading. Increasingly in health settings, project managers also engage in managing quality and marketing as they seek to assure the success of their projects. This section focuses on the core strategizing, designing, and leading activities of project management, as shown earlier in the chapter in Figure 8.1.

As Figure 8.1 illustrates, the core management activities are highly interrelated. No single activity is performed in strict isolation from the others. For example, effective strategizing lays the foundation for effective relationships among people and other resources necessary to achieve the desired results established for a project. It also provides the blueprint managers use in leading others in contributing to their achievement. Furthermore, the core activities are not particularly sequential. In reality, managers may engage in all three of the activities more or less simultaneously. How well managers engage in each of the core activities affects their performance in the others.

How managers carry out the core management activities as they establish and operate their project's logic model and how the model can help them integrate and coordinate their performance of the three activities are discussed in the following sections.

8.2.1 Strategizing

When managers are establishing and revising the outputs, outcomes, and impacts desired for their projects, and when conceptualizing the means of accomplishing them, they are *strategizing*. This activity also aides managers in adapting their projects to the challenges and opportunities presented by the external environments of their projects (Swayne et al. 2006).

Strategizing activities are crucial to the success of projects in health systems and other settings for good reason. Perhaps none is more important than the simple fact that this activity focuses attention on desired results and on achieving them. Good strategizing yields statements of intended outputs, outcomes, and impacts, and it conceptualizes the means through which these can be achieved. In this way, strategizing contributes to the coordination and integration of the actions of all participants in a project toward shared purposes.

Another reason strategizing is important is that it helps offset the pervasive uncertainty that projects frequently face. When managers think about the future in systematic ways and plan for contingencies that can be imagined or foreseen, they greatly reduce the chances of being caught unprepared. Uncertainty cannot be eliminated, but it can be prepared for through strategizing. Conditions of uncertainty require that project managers be adaptable and flexible; strategizing is critical to both.

Key Elements in Strategizing. Strategizing occurs as projects are being developed, as well as over the course of their life cycles. When managers strategize for a nascent project, they are required to engage in somewhat different activities than when strategizing for an ongoing project. The special circumstance of the initial round of strategizing for a new project being developed involves preparing a *business plan* (Abrams 2003) for the project, which includes the development of the project's original logic model.

In an ongoing project, managers strategize, often with the involvement of other participants in the project, in order to answer four critical questions about the project:

1. What is the current situation of the project?

2. In what ways do we want our project's situation to change in the future?

3. How will we move our project to the preferred future state?

4. Are we making acceptable progress toward the desired future state?

In seeking answers to these questions, managers use a variety of tools and techniques. Complete explication of these is beyond the page constraint of this chapter. Suffice it to say here that managers use situational analysis, both internal and external aspects of a project (Swayne et al. 2006), in answering the first question. This analysis includes compilation of an inventory of desired results as part of providing a complete picture of the project's situation. Through a complete situational analysis, a manager considers the results that a project is intended to achieve in relation to the opportunities and threats it faces from the external environment, and in relation to the project's internal strengths and weaknesses. Sometimes the internal and external situational analyses are termed a *SWOT analysis*, an acronym derived from the fact that the analysis is conducted to determine a project's *strengths*, *weaknesses*, *opportunities*, and *threats*. SWOT is among the most widely used analytical tools in strategizing, because it is intuitive and relatively simple to use (Luke et al. 2004).

Managers address question number two by reconsidering the components of a project's logic model: inputs and resources, processes, outputs, outcomes, and impact. Revisions and modifications in logic models serve as the mechanism to answer question number 3. Such revisions may involve changing any part of a project's inputs, processes, and desired results. Techniques of assessing and controlling performance and evaluating results are the mechanisms through which an answer to question number 4 can be formulated.

Interventional Planning. In addition to the broader aspects of their strategizing activities, project managers in health settings also utilize a more focused type of planning, called *interventional* *planning*. Statements of desired results, whether in the form of outputs, outcomes, or impact, can be thought of as the *ends* sought through projects. The accomplishment of these desired results depends upon developing and implementing good interventional plans, which are the detailed *means* of how the ends can be accomplished.

Once decisions about ends have been made, decisions about means can be addressed. In interventional planning, project managers develop and assess alternative means for achieving established ends and select the specific manner in which the ends will be pursued. Much of the day-to-day activity of project management consists of finding effective means to accomplish established ends.

While there usually is no formula for selecting the most appropriate means to accomplish desired ends, once alternative ideas about means have been placed on a menu for consideration, their relative advantages, disadvantages, and potential effects and implications can be assessed. The task is to assess the available alternatives relative to each other and select those thought to offer the best chance of accomplishing the desired ends.

In some situations, interventional planning can influence decisions about ends. A desired output, outcome, or impact established for a project that cannot be achieved by any means must be reconsidered. Therefore, although we are discussing ends and means in this order, in reality decisions about each influence the other.

If a project manager concludes that a particular desired result cannot be achieved with available or obtainable inputs and processes, then the desired result must be modified or abandoned. Similarly, a project manger choosing between two equally attractive ends for a project—when both cannot be achieved simultaneously—can readily make the choice if the costs of their accomplishment are significantly different. However, great care must be exercised in permitting assessments of means to influence decisions about ends. In general, means are not as important as ends. Means are but ways to achieve the ends of a project. A project's ends are the reason it exists.

A Comprehensive Example of Interventional Planning. Interventional planning involves the application of planning techniques to the development, implementation, and evaluation of interventions undertaken by projects. In small, highly focused projects—those intended to engage in a single specific intervention such as conducting a single highly focused health education project, for example—the distinction between overall strategizing and interventional planning may not be relevant. That said, in larger projects, an important distinction exists between the overall strategizing done for an entire project and the interventional planning done for specific interventions developed and provided within such projects. The following example will help distinguish interventional planning from the more general strategizing activities in which project managers engage.

A successful health education project, established by and embedded in a county health department, has served a number of clients for several years. Among the clients are groups of citizens of the county who have been categorized by demographic characteristics (elderly, minority, female teenagers), clinical condition (diabetes, obesity, drug abusers), and affiliation (elementary school students, elderly day-care program participants). All of the health education interventions for these clients are paid for through public funds made available to the health department or through grants from foundations.

In strategizing this project's future, its manager determined that it is important to enhance the resources available to the project by adding private, paying clients. The health education project manager envisions many benefits available to the project from broadening the base of financial support through the addition of corporate clients who will pay for services.

Detailed interventional planning as to how to add new private clients led to some of the project's health educators visiting the benefits managers at local companies and other businesses to explain the advantages of sponsoring various health education interventions for their employees. This resulted in two new clients for the coming year: a large financial services firm and the local plant of an international manufacturing firm.

Good strategizing paid off for this health education project, but the success achieved by adding the new clients triggered the need for additional interventional planning. The project manager assigned a health educator to each of the new corporate clients to conduct the necessary interventional

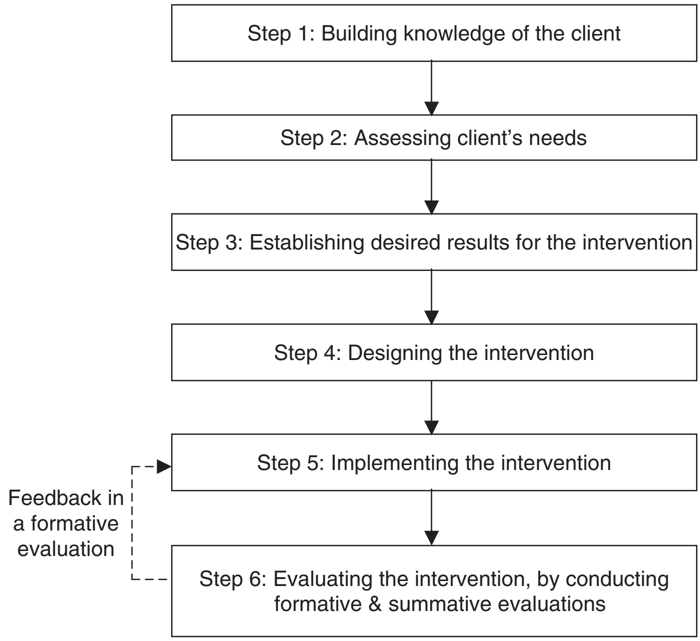

FIGURE 8.4 Model of interventional planning (Adapted from *Managing Health Programs and Projects* with permission of John Wiley & Sons, Inc.)

planning to guide the provision of health education services. Interventional planning is undertaken in a series of six steps, as shown in Figure 8.4. The health educator's role in each step in the interventional planning for the client is described in the following pargraphs.

Step 1: Building knowledge of the client (which can be an organization or a group of individual clients). Each health educator met separately with a key representative of the educator's new client, the benefits manager at the plant, and the vice president of human resources at the financial services company. These meetings were intended to obtain the views of these representatives of the clients as to what might be accomplished through the health education intervention. In each case, information about the organization, including information about utilization of health benefits by employees and their family members, was reviewed. Later, in building knowledge of the clients, interviews with groups of employees and family members were conducted, and a health education committee was formed with representation of management and employees for each client.

Step 2: Assessing client's needs for health education. In each situation, with the help of the health education committee, the educator conducted a *needs assessment* (Peterson and Alexander 2001), including a survey of behavioral risk factors that was completed by samples of employees and their family members and the conduct of several focus group meetings to explore possible needs upon which to focus the intervention. The committees also reviewed insurance claim data for their firm's employees and their dependents over several years and the HEDIS (Health Plan Employer Data and Information Set) made available by NCQA (National Committee on Quality Assurance) on the health plans in which employees and their families were enrolled. (Information about NCQA and HEDIS is available at www.ncqa.org).

The assessment in both situations identified several areas of need for a health education intervention. In the financial services company, the most compelling need was that employees and their adult family members were experiencing a significantly higher rate of type 2 diabetes than would be expected in a population of this age and gender structure. In the plant, the most compelling problem was injury prevention among employees, especially back injuries caused by lifting.

Step 3: Establishing desired results for the intervention. With the involvement of the health education committee, the educators developed statements of the desired results of the interventions. These included impact, as well as more specific results expressed as desired outputs and outcomes. At the financial services company, the desired impact was to reduce the incidence of type 2 diabetes among employees and their spouses to a level consistent with that expected in a group with this age and gender structure. The desired impact for the plant was to reduce the incidence of injuries to a rate no greater than the industry average. In both cases, it was anticipated that these ultimate impacts would take many years to achieve and would not occur until well after the intervention had been completed.

Desired outputs developed for the financial services company included a specific number of face-to-face education sessions to expose employees and spouses to information about diabetes, and the production and distribution of printed information about the disease, including its prevention, diagnosis, and appropriate treatment. Another desired output was the inclusion of information on diabetes on the company's Web site. The committee also established a desired outcome that following the intervention, all employees with type 2 diabetes would have appropriate hemoglobin A1c (HbA1c), lipids (LDL-C), and kidney disease monitoring (microalbuminuria test), as well annual eye examinations. Appropriate desired outcomes also were established for the health education intervention at the plant, although the financial services company will be used as the example for the remainder of this discussion.

Step 4: Designing the intervention. The educator assigned to the financial services company designed the intervention to include a number of specific education activities. The design was influenced heavily by the recommendations of the National Diabetes Education Program (NDEP), especially those developed in its section on "The Business Community Takes on Diabetes." The NDEP is a partnership of the National Institutes of Health, the Centers for Disease Control and Prevention, and more than 200 public and private organizations (www.ndep.nih.gov).

The design of the intervention also was guided by the educator's use of the design features of a number of well-established health education planning models, including the following:

- PRECEDE-PROCEED Model for Health Promotion Planning and Evaluation (Green and Kreuter 1999)
- Model for Health Education Planning (MHEP) (Ross and Mico 1980)
- Multilevel Approach to Community Health (MATCH) (Simons-Morton et al. 1995)
- CDCSynergy, a health communication model developed by the Centers for Disease Control and Prevention (CDC 1999a)
- Social Marketing Assessment and Response Tool (SMART) (Neiger and Thackery 2002)
- Planning, Program Development, and Evaluation Model (PPDEM) (Timmreck 2002)
- Generalized Model for Program Planning (GMPP) (McKenzie et al. 2005)

Step 5: Implementing the intervention. The health educator implemented the intervention by carrying out the activities called for in its design, including distributing an information sheet about diabetes in the pay envelopes of all employees. Over the course of the implementation, this was followed up with additional information sheets about aspects of diabetes in employee pay envelopes. Two articles about diabetes were written for and included in the company newsletter, and information about the disease was featured on the company's Web site. Posters to enhance awareness about the disease were posted throughout the company.

Employees and their family members with diabetes received special mailings with information about how to interact effectively with their physicians. They were provided information produced by the NDEP about specific questions to ask their physicians:

1. What are my blood sugar, blood pressure, and cholesterol numbers?
   What should they be?
2. What actions should I take to reach these goals?

The employees and their family members were also given wallet cards on which to record and track these numbers.

Step 6: Evaluating the implementation. All interventions should be evaluated, although the extent of the evaluation can vary depending on the importance of its results and the available resources. Evaluations are analytical processes involving the collection and analysis of data and information that allows managers to improve interventions while they are in progress, and to measure the degree to which desired results are achieved after the interventions conclude (Rossi et al. 2003). Useful information for conducting evaluations can be found in a comprehensive framework used by the Centers for Disease Control and Prevention to guide evaluations of its programs (CDC 1999b).

The Relationship Between Strategizing and Controlling Projects. As we have seen, strategizing is an important management activity because it facilitates project managers' efforts to choose projects' desired results or ends, and the means of accomplishing them. In addition, strategizing also sets the stage for project managers to successfully *control* the conduct and results of their projects. Controlling relies on comparing actual results with some predetermined desired result and taking corrective actions when actual results do not match desired results. Good strategizing yields statements of desired results against which actual results can be compared.

Control techniques are based on the same basic elements regardless of whether quality, cost, staff or patient/customer satisfaction, or some other variable is being controlled. Controlling, wherever it occurs, involves four steps: 1) establishing standards or desired results, 2) measuring performance, 3) comparing actual results with standards or desired results, and 4) correcting deviations from standards or desired results when they occur.

The strategizing activity is brought full circle through a determination of whether acceptable progress is being made toward achieving a project's desired outputs, outcomes, and impact. By determining whether ongoing performance is acceptable and whether appropriate progress is being made toward achievement of the desired future state established for a project, *and* by making adjustments and corrections if inadequacies are detected, managers increase the likelihood of eventually achieving the results desired for their projects.

Technically, *controlling* in work situations is the regulation of actions and decisions in accord with the stated desired results. Monitoring the results accomplished and feeding this information back to those who can influence future results is a normal, pervasive, and natural phenomenon in work settings, including health system projects.

Controlling involves monitoring performance, comparing actual results with previously established desired results and standards, and correcting deviations that are found. Figure 8.5 illustrates these interrelated parts of controlling when applied to assessing progress and controlling performance in the laboratory of a project designed to screen for HIV infection. Note that the work of this laboratory is modeled in terms of the logic model presented in Figure 8.3, with the added elements necessary for assessing progress and controlling performance.

In this model, desired results are established early in strategizing for this project's laboratory. Desired results in the form of outputs, outcomes, and impact are the targets or ends desired for a project, or in this case, as a unit of a project. Standards are typically established by professions, regulators, and accrediting agencies. Together, the project's desired results and the standards become the criteria against which performance can be compared and judged.

In monitoring and comparing, actual performance is measured. There is no substitute for direct observation and personal contact by managers as they monitor performance, although such techniques are often inefficient. Thus, some monitoring is conducted through other means. Written reports on performance can be especially useful for managers with large or diverse domains of responsibility. To monitor performance in large projects, managers may have to rely almost exclusively on written or verbal reports provided by others.

Project managers also may find information systems (IS) useful in their controlling efforts (Austin and Boxerman 2003). These systems can be designed so that information relevant to control can be collected, formatted, stored, and retrieved in a timely way to support the monitoring and

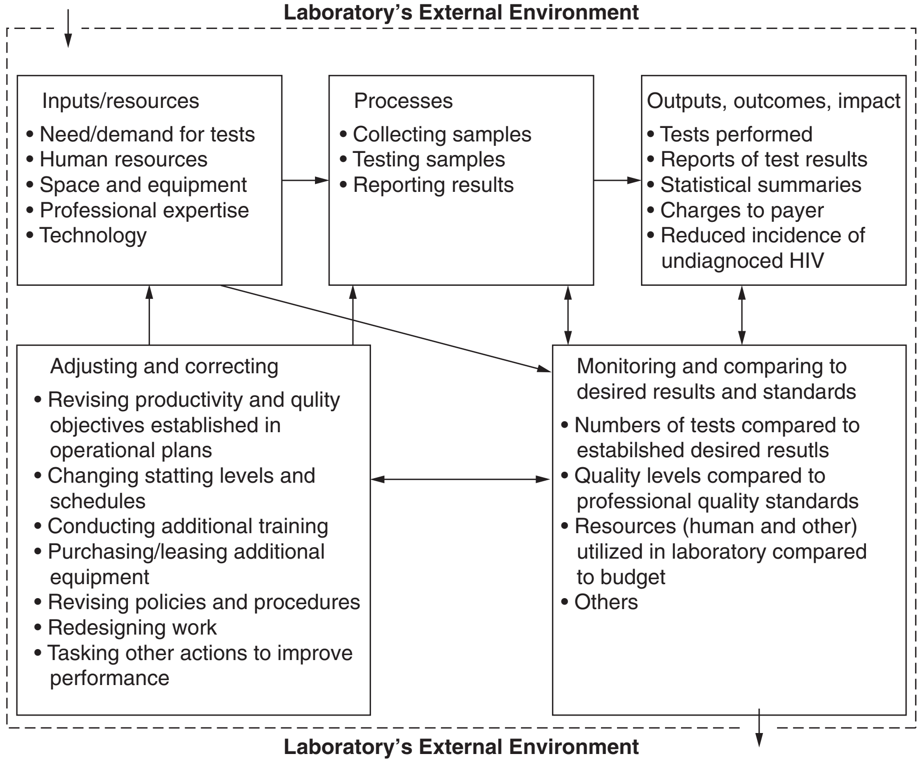

FIGURE 8.5 Control of performance in an HIV-screening project's laboratory (Adapted from *Managing Health Programs and Projects* with permission of John Wiley & Sons, Inc.)

comparing aspects of controlling. An IS can be relatively simple or very elaborate. If it is to be useful, however, an IS should report deviations at critical points. Effective control requires attention to those factors that actually affect a project's performance. A good IS will report deviations promptly and contain elements of information that are understandable to those who use the system. Finally, a good IS will point to corrective action. A control system that detects deviations from accomplishment of desired results or from standards will be little more than an interesting exercise if it does not show the way to corrective action. A good IS will disclose where failures are occurring and who is responsible for them, so that corrective action can be undertaken.

When monitoring and comparing reveals deviations from the accomplishment of desired results or from adherence to appropriate standards, adjustments are made or corrective actions are taken to curb undesirable results and bring performance back in line. When deviations occur, effective control requires that corrective actions be taken, as shown in Figure 8.5. However, knowing what actions to take can be a difficult challenge for managers.

Managers should base their decisions about adjustments and corrective actions on a careful analysis of the situation, starting with consideration of the desired results and standards against which they are monitoring performance. After all, the desired results may have been poorly conceived; conditions may have changed, rendering them inappropriate; and standards undergo revisions from time to time. Only after a thorough analysis of the reasons for a deviation will a manager be in a position to take effective corrective actions such as revising desired results, changing a process, redeploying resources, a simple discussion with staff about their work, a change in technology employed, more training, better equipment, more time, a new schedule, or any of an enormous range of other means of rectifying the situation.

8.2.2 Designing

The logic models of projects, as well as the organizational structures of larger projects, must be designed initially and then redesigned as the circumstances of projects change over time. As project managers engage in *designing* activity (see Figure 8.1) they do the following:

- Establish the initial logic models of their projects and subsequently reshape them as circumstances change.
- Establish and change the organizational structure—that is, the intentional patterns of relationships among human and other resources within projects (if they are large enough to have structures).
- Establish or change the relationships of their projects to their external environments, including, when relevant, to the larger organizational homes in which projects are embedded.

In larger projects, based on the project's logic model, designing activity permits managers to design and build organizational structures for their projects. These structures can be very small, involving a few individuals, or they can be large and complex, involving many individuals. Whether large or small, people are a key resource in all projects. In larger projects, the designation of individual positions and the aggregation or clustering of these positions into the work groups, teams, or other subunits of a project is a critical aspect of a manager's designing activity. The number and type of individual positions are typically determined by a project's size and scope, as well as how the work in the project is allocated and specialized.

Successful project designs depend upon appropriate distributions of *authority* and *responsibility.* Authority is the power one derives from a position in a project's organization design. Responsibility can be thought of as the obligation to execute work in the project or to oversee or supervise the work of others in the project. All staff in projects have responsibilities as a result of their positions. The source of responsibility is one's organizational superior in the project. By *delegating* responsibility to an organizational subordinate, the superior creates a relationship based on obligation between superior and subordinate. Effective organization designs achieve a balance between authority and responsibility. When responsibility is delegated to person, that person also must be given the necessary authority to make commitments, use resources, and take the actions necessary to fulfill the responsibility.

Depending on a project's circumstances, a design challenge can be the degree of *coordination* required among its participants. A correlation exists between the degree to which a project's work is divided and the need for attention to coordination among participants. The more the differentiation of work, the more important, and often more difficult, the coordination task is likely to be.

Projects in health systems, and certainly the larger organizations in which many of them are embedded, are often characterized by considerable division of work into a number of professional and technical jobs. The work done in these settings is so often performed by such a variety of workers that very significant coordination problems arise. In addition, work done by different people and groups in projects is highly interdependent. This condition of functional interdependence makes achieving coordination an important aspect of a project's organization design.

Another key to successful organization designs in projects is the inclusion of features that minimize and resolve *conflict* among project participants. Individuals participating in projects may perceive its desired results differently or may favor various pathways to their fulfillment. Conflict may arise between and among any of the various participants in a project, as well as with others outside the project. In fact, both forms of conflict should be anticipated and can be addressed at least partially through organization design. Even such low levels of conflict as those evidenced by some staff disliking other staff or having difficulty in getting along with others can reduce performance in a project. Thus, the prevention or resolution of conflict is an important aspect of successful organization designs; effective designs for projects facilitate the management of conflict.

Designing Logic Models. When managers establish the desired results for a project expressed as *outputs*, *outcomes*, and *impact*, designing is already underway. Desired results are an integral component of the logic model for any project (see Figure 8.3), and this component drives much about how the other components of a logic model are designed. The other components are designed to accomplish the desired results established for the project. In designing logic models, managers must carefully consider the *processes* through which *inputs/resources* are used to produce outputs, outcomes, and impacts.

Designing the Inputs/Resources Component of a Logic Model. In designing the inputs/resources component of a logic model, attention is given to the human, financial, technological, and organizational inputs necessary for a project to achieve its desired results. Depending on the situation of a particular project, it is likely to require a unique package of resources, typically including some mix of human resources, funding, potential collaborators, technology, organizational or interpersonal networks, physical facilities, equipment, and supplies (W. K. Kellogg Foundation 2001).

Although all of the inputs/resources needed to make a logic model work are important in considering a project's design, none is more important than its human resources. Organization designs of projects begin with the designation of individual positions, which can then be clustered into work groups or other subunits of the project as its size and complexity dictate. Projects embedded in larger organizations can take advantage of the specially trained human resource professionals who typically orchestrate this highly specialized process in organizations. The reader will find excellent, in depth discussion of general human resource management in Mathis and Jackson (2005); and in Mondy, Noe, Premeaux, and Mondy (2001). Comprehensive discussion of human resource management in health care contexts can be found in Fottler, Hernandez, and Joiner (1998); Fried, Fottler, and Johnson (2005); and Longest, Rakich, and Darr (2000).

Human resource planning involves gathering and analyzing information to identify human resource needs and planning for meeting the needs. The way a project's future has been strategized is very important to its human resource plans. For example, plans to diversify into new activities, such as a wellness intervention, or to increase provision of current services significantly will directly affect the human resource profile.

It is advisable that managers pay special attention to diversity in staffing their projects. Demographic changes in the United States are creating a more culturally diverse labor pool as well as a more culturally diverse patient/client base for projects. Recent studies suggest that cultural diversity is associated with better performance in health care settings (Dansky et al. 2003). This derives in part from the relationship between greater diversity and increased cultural competence, which supports improved performance.

The Office of Minority Health of the U.S. Department of Health and Human Services has published *National Standards for Culturally and Linguistically Appropriate Health Services* (2001). In this report, cultural competence means "having the capacity to function effectively as an individual or an organization within the context of the cultural beliefs, behaviors and needs presented by consumer and their communities" (131). Among the recommended standards to enhance cultural competence is that all health care organizations—including projects—should have diverse staffs that are representative of the demographic characteristics of the populations they serve.

Designing the Processes Component of a Logic Model. In designing the processes component, attention is given to the activities, events, procedures, and techniques used to perform the work necessary for a project to achieve its desired results. Every project, depending on its specific circumstances, requires a unique mix of various processes to achieve its desired results. For example, service provision processes differ in many ways depending on whether a project is focused on cancer care, cardiac rehabilitation, geriatrics, health education, home care, palliative care, prevention, promotion, substance abuse, wellness, or women's health. Similarly, significant differences are likely to be found in the processes used in such projects as research or demonstration projects pertaining to a particular health determinant or in projects to increase seatbelt use, encourage healthier eating, or the practice of safe sex. Other projects, such as designing and equipping a laboratory, training staff in a new protocol or technology, or designing an information system, may involve even greater differences. Each project is unique in some ways and therefore requires a unique mix of processes if its desired results are to be achieved. Different processes require different activities, events, procedures, and techniques.

The challenges in designing processes include decisions such as the basic methods through which services will be provided. Will they be provided to individual patients/clients or provided in a congregate setting or even in the homes of patients? Within each service a project provides is a specific set of tasks that determine how the service is provided. For example, provision of counseling services in a drug-treatment project could involve the following tasks:

- Intake and screening of patients/customers
- Case planning by a counselor
- Implementation of the case plan
- Monitoring of service provision processes by a project manger
- Evaluation of the effects of services for the patient/customer
- Termination of the patient/customer from services at completion
- Follow-up

Designing the processes component of a project's logic model is a complicated undertaking. Adding the determination of inputs/resources and the determination of desired results suggests the extent of the challenge in designing a complete logic model as depicted in Figure 8.3. This challenge is further extended by the fact that logic models are not static; they undergo continuing revision throughout the life of a program or project.

In combination, a project's logic model and its organizational structure provide a comprehensive snapshot of the project, what it intends to accomplish, and how it intends to accomplish its desired results. The snapshot provides guidance for the third core activity project managers engage in, leading.

Leading. As project managers seek to influence staff to contribute to the performance of their projects, they engage in *leading*. No matter how well a manager strategizes and designs, a project's success also depends on the manager effectively leading. In leading a project's staff, the manager seeks to instill in them a shared vision of a project's logic model and stimulates determined efforts to make the model work. Leading requires managers to help others become motivated to contribute to the project's performance.

Leading successfully in any setting is challenging, especially so in projects where leaders must satisfy diverse constituencies. Not only must the needs and preferences of a project's patients/clients, who themselves are not likely to be homogeneous in their needs and preferences, be taken into account, but so must the needs and preferences of other project staff. Only rarely are the needs and preferences of all participants in a project in harmony.

Leading Defined. Adapting well-known definitions (Pointer 2006; Yukl 2002), leading by project managers can be defined as *influencing others to understand and agree about what needs to be done in order to achieve the desired results established for a project, and facilitating the individual and collective contributions of others to achievement of the desired results*. Influencing is the most critical element of the leading activity, its "center of gravity" (Pointer 2006, 128). Influence is important to success in leading because it is the means by which "people successfully persuade others to follow their advice, suggestion, or order" (Keys and Case 1990, 38).

What project managers do when leading is complex and multidimensional, although in essence it is one person influencing other people. In his seminal study of leadership, for which he won a Pulitzer Prize, James Burns (1978) identifies the central function of leadership: to achieve a collective purpose. Leading is the way in which managers can influence the contributions of others to the accomplishment of the desired results established for projects. A key aspect of the of manager's ability to influence the contributions of others is through the manager's ability of to affect the *motivation* of others to contribute.

Motivation Defined and Modeled. The concept of motivation is at once simple and complex. Motivation is simple because human behavior is goal-directed and is induced by increasingly well-understood forces, some of which are internal to the individual, others external. Motivation is complex because mechanisms that induce behavior include very complicated and individualized needs, wants, and desires that are shaped, affected, and satisfied in different ways for different people.

Why does one person working in a project work harder than another? Why is one more cooperative than another? One answer is that people have various needs and behave differently in attempting to fulfill their needs. Abraham Maslow, in the 1940s, formulated a theory of motivation that stressed two fundamental premises (Maslow 1943; 1970). First, Maslow argued that human beings have a variety of needs, and *unmet* needs influence behavior; an adequately fulfilled need is not a motivator. His second premise was that people's needs are arranged in a hierarchy, with "higher" needs becoming dominant only after "lower" needs are satisfied. The needs are, in effect, deficiencies that cause people to undertake patterns of behavior intended to fill the deficiencies. For example, at a very simple level, human needs are physiological. A hungry person needs food, is driven by hunger, and is motivated to satisfy the need for food. Other needs are more complex. Some needs are psychological (such as the need for self-esteem), others are sociological (such as the need for social interaction). In short, needs in human beings trigger and energize behaviors intended to satisfy the needs. This fact is the basis for a model of how motivation occurs.

As shown in Figure 8.6, the motivation process is cyclical. It begins with an unmet need and cycles through the individual's assessment of the results of efforts to satisfy the need, which may confirm the continuation of an unmet need or permit the identification of a new need. In between, the person searches for ways to satisfy the need, chooses a course of action, and exhibits goal-directed behavior intended to satisfy the unmet need. The model is oversimplified, but it contains the essential elements of the process by which human motivation occurs:

- Motivation is driven by unsatisfied or unmet needs.
- Motivation results in goal-directed behaviors to satisfy the unmet needs.
- Motivation can be influenced by factors that are internal or external to the individual.

This model also suggests a definition of motivation: *an internal drive, which is a stimulus to behavior that is intended to satisfy an unmet need*. In the words of Fottler, O'Connor, Gilmartin, and D'Aunno (2006, 81), motivation is "a state of feeling or thinking in which one is energized or aroused to perform a task or engage in a particular behavior." It is important to note that the direction, intensity, and duration of this state can be influenced by outside factors, including the ability of managers to contribute to or impede the satisfaction of the individual's needs.

Motivation is a key determinant of individual performance in work situations and is of obvious importance in accomplishing the desired results established for projects. However, motivation alone

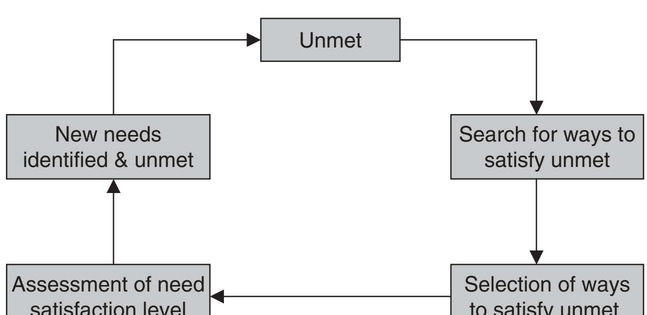

FIGURE 8.6 The motivation process (Adapted from *Managing Health Programs and Projects* with permission of John Wiley & Sons, Inc.)

does not fully explain individuals' performance. It is only one of many variables affecting performance. Intelligence, physical and mental abilities, previous experiences, and the nature of the work environment also affect performance. Good equipment and pleasant surroundings facilitate performance. The variables affecting performance can be conceptualized as follows:

$$\text{Performance} = \text{Ability/Talent/Experience} \times \text{Environment} \times \text{Motivation}$$

This equation shows that performance is a function of an interaction of several variables (O'Connor 1998). Without motivation, no amount of ability or talent and no environmental conditions can produce acceptable performance. Although motivation alone will not result in a satisfactory level of performance, it is so central to performance that managers must understand this process if they are to influence the contributions of others effectively to achieve a project's desired results.

Toward an Integrative Approach to Effective Leading. Clearly, managers' effectiveness at leading contributes to the performance of individuals working within their projects. Among the core activities of managers, effective leading is as important as effective strategizing and designing.

Leading has been studied over many years through seeking to understand the traits and characteristics of effective leaders, their behaviors toward those they seek to lead, and the situations in which leadership is exercised. These different approaches have resulted in numerous models, each seeking to explain the phenomenon of effective leading. Individually, however, none of the models fully explains how a leader is effective because of the complexity and variety of variables involved in leading. Leading is a dynamic process "that does not reside solely within a given person or a given situation; rather, situations create an interplay of needs, and effective leaders work to continually identify and meet them" (Druskat and Wheeler 2003; 438).

It is possible, however, to integrate portions of the different models into a useful approach to effective leading activities by project managers. Leading effectiveness results from interactions among variables including leader traits and behaviors selected to fit situations, all of which are mediated or influenced by intervening variables such as efforts and abilities of those being led, organization design features, and availability of appropriate inputs/resources in a project's logic model. Furthermore, in projects, participative styles of leading work best most of the time.

Above all else, it is important for managers to realize that because leading is a matter of influencing others to contribute to achieving the desired results established for a project, they must help others be motivated to make their contributions. Motivation is a means to the end of leading others to make contributions that help accomplish a project's desired results.

In terms of using motivation in the leading activity, it is crucial to select motivated individuals to fill positions in a project. People who have demonstrated appropriate levels of performance in the past are motivated to perform and will likely continue to perform well under favorable conditions. Leading them to contribute to accomplishment of desired results is rather straightforward. This aside, however, some of the most significant challenges of leading and helping individuals to be motivated in the workplace arise because managers do not clearly define and specify the desired results—outputs, outcomes, and impacts—toward which they want others to contribute. Being an effective leader, and utilizing motivation to support this, begins with clear statements of desired results, which are especially useful when those who will be influenced by them have participated in their formulation and agree with them.

The models of how motivation occurs show the powerful and direct connections among individuals' efforts, performance, and rewards. A critical step in motivating people is choosing appropriate ways to reward desired performance, remembering that rewards can be intrinsically derived from the work itself or extrinsically provided by managers.

It is important to remember that people have different preferences about rewards. Reward selection is made more difficult because of individual tastes and preferences regarding rewards. Some people would rather have more challenging assignments or more vacation time than more money. For others, the reverse may be true. The point for managers to remember is that rewards must be important to the person receiving them if they are to be effective motivators. Often, preferences for rewards can be determined simply by discussing the matter of their preferences with others.

Selecting suitable rewards is only part of the process of using rewards to motivate. Managers must link rewards to suitable job performance; that is, rewards must be made contingent upon performance, and the linkage must be explicit. The more a person learns about the relationship between performance (with clearly established expectations about performance) and rewards, the more likely rewards will help motivate desired performance.

The performance-reward linkage is strengthened when rewards follow as soon as possible after desirable performance and by extensive performance feedback to participants. Finally, it is important to remember that people have a strong preference for being treated fairly or equitably. Their perceptions about the linkage between performance and rewards at work are fundamental to their sense of fairness. Managers must pay careful attention to the equity implications of their use of rewards.

We have also seen that motivation alone does not fully account for performance or for the contributions others make toward accomplishing the desired results established for a project. An individual's performance is also determined, in part, by the person's abilities and by constraints in the work situation such as uncoordinated workflow or inadequate budgets for technology or training. This means it is important for project managers, as they seek to motivate and lead, to remove or minimize barriers to performance. Barriers of inability to perform can be addressed through increased education and training and in some cases by more careful matching of people with positions. Situational constraints, such as inadequate inputs/resources or poorly designed logic models that impede performance, can be addressed once they are identified as constraints.

8.3 SUMMARY

In this chapter, *projects* are defined as groups of people and other resources formally associated with each other through intentionally designed patterns of relationships in order to pursue some preestablished results. Figure 8.3 shows how projects can be usefully conceptualized as *logic models,* which are schematic pictures of the relationships among the inputs or resources available to projects, the processes undertaken with the inputs, and the desired results—outputs, outcomes, and impacts—projects are intended to achieve. In effect, logic models provide road maps of how projects are intended to work. By understanding its logic model, a great deal is known about any project.

Project logic models permit *project management* to be defined as the activities through which the desired outputs, outcomes, and impacts of projects are established and pursued through various processes utilizing human and other resources. A project's logic model permits us to see that the project's manager(s) are responsible for the following:

- Establishing the project's desired outputs, outcomes, and impact
- Assembling the necessary inputs and resources to achieve the desired results
- Determining the processes necessary to accomplish the desired results and ensuring that the processes are implemented effectively and efficiently
- Performing the steps above while analyzing variables in the project's external environment, assessing their importance and relevance, and responding to them appropriately

In managing projects, mangers engage in an interrelated set of *core activities* (strategizing, designing, and leading). These core activities are supported and facilitated by other management activities, such as decision-making, communicating, managing quality, and marketing. However these facilitative activities are beyond the scope of this chapter. Figure 8.1 illustrates the integrated and intertwined nature of the core activities of management.

To understand managing, it is necessary to understand the intertwined set of core activities depicted in Figure 8.1, which shows that each core activity affects and is affected by the other core activities. No one of the activities can be performed well in isolation from the others. How well managers perform any one of the core activities affects performance of the others.

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CHAPTER 9
MANAGING INTERNATIONAL PROJECT MANAGEMENT TRAINING

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9.1 OVERVIEW

When designing and delivering project management training in the international arena, it is necessary that you pay special attention to the background and character of the audience. Emphasis must also be given to cultural differences, particularly in the training of foreign nationals. Special provisions may also be required for logistics, lodging, and subsistence matters. Case studies of the author's experience in PM training in China, Bosnia, Occupied Territories (Palestine), Ukraine, Russia, and Macedonia are described. The applicability of the project management (PM) approach is shown to be an important consideration toward realizing a successful training program. Particular emphasis is paid to the use of selected PM knowledge areas such as human resource management and communication management.

9.2 BOSNIA AND HERZEGOVINA

The subject course was jointly sponsored by the World Bank (WB) and the Austrian Study Center for Peace and Conflict Resolution (ASPR). This was the fourth course of a scheduled multi-course effort over a three-year period, and, unlike the previous three courses that presented separate (nonintegrated) topics, this course was designed to integrate project management principles with those of conflict management. Three more similar courses were to be delivered during the following year.

Following are the major accomplishments of the program:

- The successful delivery of a newly designed course that integrated the principles and practice of project management and implementation with those of conflict resolution
- The joining of the two factions of Bosnia, Serbs and Muslims, in a teamwork environment with subsequent improvement in social and classroom interrelationships
- The learning of theory and skills that will enhance their professional performance in their positions as government managers

The participants consisted of middle-management government representatives from the Bosnia Federation (Muslims and Croats), and the Republica Syrpska (Serbs). Both male and female participants were included. The venue was at the castle Burg Schlaining in Southern Austria (Burgenland). One seminar room and two breakout rooms were provided by ASPR and proved quite adequate and pleasant. Refreshments were also provided during the breaks.

The PM curriculum addressed the project cycle and its phases and components and provided lectures, case studies, and exercises illustrating the theory and skills needed for effective project implementation. Planning, organizing, directing, and controlling techniques were emphasized. Linkages to conflict phenomena were shown and investigated along with resolution techniques. ASPR provided conflict resolution lectures and exercises utilizing different conflict scenarios with group participation. A few of the exercises had caused some concern on the part of the participants since political conflict scenarios were used and caused a reversion of emotion to the recent past, which was unpleasant and of personal distress. Adjustments to this part of the curriculum were immediately made by the ASPR lecturer.

In addition to the subject matter, the course was also designed for maximum mixture of participants from both entities (Bosniac and Serb). This was accomplished through group exercises and case studies having different group memberships. Over the three-week period, it was observed that both entities improved their interrelationships and were very effective in presenting individual group reports on a consensual basis. Group dynamics were also observed to be cooperative and synergistic.

The last few days of the course were devoted to bringing together the material presented and learned in the previous weeks. Each of five groups submitted an original project that addressed the needs of their community and that was analyzed using the techniques in project implementation and conflict resolution that had been studied. The presentations and analyses were articulate and logical and showed an effective understanding of the planning and management processes involved in implementation.

Analysis of the evaluations made by the participants at the end of the course showed a consistent viewpoint that future courses should relate the conflict resolution portion more toward project management and less toward societal and political scenarios. This was also the opinion expressed verbally to the lecturers at various times during the course. Subsequent conversation with the deputy director of ASPR showed his understanding of comments made by the participants, and it was agreed that the next course should be improved in integration of the two disciplines. He was of the opinion, however, that societal and political conflict factors play an important role. Projects operate within a system that is affected by an external environment having such intrinsic factors. It was decided that the course could well be of interest to other post-conflict societies.

9.2.1 Bosnia Program Overview

The program was presented over a three-week period, three times per year, for a period of three years. Each third week was spent in planning and presenting a project that was offered by groups of four participants. Each project was required to be of benefit to the country as a whole and planned, designed, and justified by the mixed member group. The criteria for justification involved, *inter-alia*, consideration of economic factors as well as technical adequacy. Included were topics such as earned value analysis; cost and schedule controls; planning, design, and construction considerations; and an emphasis on the management of conflict during the life cycle of the project.

Classes were conducted five days per week, seven hours per day. The day started at 9 A.M. and lasted until 6:30 P.M. A mid-day break lasted from 12:30 to 3 P.M., in accordance with European and Bosnian custom. Short morning and afternoon breaks were also provided along with refreshments.

Pedagogy. The program was designed for the use of a lecture format, usually for morning sessions, and exercises, case studies, and group discussions during the afternoons. Word Bank recommendation for training is that 70 to 75 percent of the course content be devoted to student participation activities and the rest to the lecture format. To ensure communication, a full-time translator was employed.

Social Considerations. It was considered that a necessary part of a program of this nature was the provision of sufficient time for organized social contact. Thus, Wednesday evenings were set aside for trips to a local restaurant or wine establishment, where songs could be sung and acquaintances and friendships developed. This part of the program proved particularly popular and effective in ameliorating past enmities and concerns.

9.3 THE OCCUPIED TERRITORIES (PALESTINE)

This was the second in a series of portfolio management courses cosponsored by the World Bank (WB) and the Palestine Economic Council for Development and Reconstruction (PECDAR) for participants from the private and public sectors. It was the first course ever presented in Gaza. The first was a course in procurement that took place in Jerusalem. Following a successful Procurement Training Seminar held in East Jerusalem, plans were made to hold a Project Management Seminar in Gaza.

The Procurement Seminar was attended by 54 public sector employees from various municipalities in the Occupied Territories and covered such topics as Procurement Policies and Guidelines, Procedures, Bidding Processes and Documents, Award Procedures, and Evaluations. The follow-up Project Management course would address topics such as the Project Life Cycle; Organizing for Project Management; Team Building; Human Resources Management; Planning, Cost, Schedule, and Resource Control; and Construction Management Principles and Practices. Included in the three-week course was a four-day total immersion session in computerized scheduling and control methods using state-of-the-art software applications.

Future plans called for a three-week seminar in Project Analysis, also sponsored by WB and PECDAR, to be presented in Gaza in the following year. Consideration was also being given by the WB and PECDAR for a continuing training program in Portfolio Management that would include integrated courses in project analysis, implementation, and procurement. The third course would be Decision Making for Investment.

9.3.1 Objectives

Following were the main objectives of the course:

- To introduce the framework of systems and practices in project management so that participants become familiar with and apply the key concepts in the implementation of the project life cycle, project organizations, human relations, leadership, and team building
- To have participants understand computerized methods in quantifying cost, schedule, and resources in project planning
- To have participants explore the role of project management in business and commercial relationships within the construction industry; and to identify and manage general and project-specific risks
- To have participants become familiar with the steps and procedures in estimating, bidding, evaluating tenders and awarding contracts, and to be familiar with the proper management of changes and claims as they arise during the course of the projects

9.3.2 Participants

The number of participants totaled 27—6 from municipal government offices (Deir El Balah, El-Burieg, Zawaida and El Magazi Village Councils, Nusairat, Gaza, Rafah) and 21 from the private sector representing contractors and engineering consultant firms. PECDAR had requested that the course be oriented toward the construction sector since much training was needed in PM methods to accomplish priority infrastructure projects in the occupied territories.

The selection of participants was made by PECDAR mainly by personal contact and word of mouth. This proved inefficient, resulting in insufficient numbers until the last days before the course. PECDAR had also originally decreed that the participants be fluent in English, that they be computer literate, and that they each provide their own computers. These requirements were not met, although sufficient computers were finally provided by PECDAR during the week set aside for computer *Microsoft Project* training.

No university participants attended. This reflected a reluctance on the part of the director, T&T, to involve academia in favor of training practitioners. A recommendation made by the author to have a university manage subsequent courses yielded little enthusiasm. Each participant was charged a registration fee of $100. There were no female participants.

9.3.3 Methodology and Course Description

Approximately 60 percent of the course consisted of exercises, case studies, and mini-cases with 40 percent as lectures. The course was conducted on an interactive basis with active participant involvement. A large part of the activities was conducted in small working groups. Since English was difficult for the majority, the two Palestinian consultants provided by PECDAR proved invaluable in providing clarification to the participants when needed.

The first week was spent on the classical factors of PM: the project cycle, human resources management, team building, leadership, and communications. The participants were very vocal and apparently enjoyed the multilateral discussions that came about during the week. Of particular note was the discussion of Maslow’s Theory of Hierarchical Needs and its relevance to the participants. Case studies and exercises were also used extensively.

The second week was dedicated to a hands-on total immersion course on *Microsoft Project* software and its application to an actual construction project. Due to the unfamiliarity of a significant number of participants with *Windows* software and computers in general, the first day of the week was spent on an elementary lecture and demonstration using the computer. The method of teaching for the balance of the week consisted of a lecture utilizing a PC viewer, during which the class imitated the keystrokes of the instructor. The Palestinian and WB consultants kept the participants current by continuous roving of the class and correcting actions where required. The provision of a detailed, specially designed World Bank manual on the *Project* example was invaluable in this case. The lecture portions described the scenario of the project and illustrated the actions that could happen in reality and how the computer handles and solves each case. The actions included schedule delays, resource manipulation, crashing, owner unilateral changes, and others.

The third week concentrated on applications of the PM approach to construction management. Topics included the management of the various phases of the project such as design and construction, estimating, contract administration, and claims and disputes. The latter topic caused a great deal of discussion since it held great interest for the participants’ professions and day-to-day business. Again, a number of exercises and case studies (including two large cases to bring together the three weeks work) were utilized.

The course ended with the participants giving the instructors a lunch of authentic Palestinian food followed shortly thereafter by a “graduation” ceremony arranged by PECDAR. Present at the ceremony were three ministers, officials of PECDAR, and invited guests. The Minister of Education, the Director of Training and Technology of PECDAR, and the author gave speeches and awarded EDI certificates to each of the participants. A reception followed. A syllabus for the course is described at the end of this section.

9.3.4 Evaluation

The course was well received, as evidenced by the many informal conversations held with the participants and the written evaluations. However, it was burdened by the short preparation time allotted by PECDAR, which caused problems in recruiting qualified candidates and in providing computer hardware. During the week after the start of the course, many people (10 to 15) were turned away with the promise of another course in the near future. This was probably due to the word-of-mouth publicity during the first week, showing a probable lack of efficient selection procedures prior to the course start.

The course was also hampered significantly by the participants' lack of English fluency. Since PECDAR had decreed that all lectures and written material were to be in English, and that nothing was to be presented in Arabic, the course, accordingly, proceeded at a much slower pace than that contemplated originally. This was particularly true during the week of computer application. The case studies also proved difficult, with the complaint that they were too long. It was sensed by the instructors that the cases were not read the night before but were saved for reading during the next day's group sessions, causing significant delays.

The written evaluations yielded positive results except for the questions on accommodations, meals, travel, and social activities. These arrangements were made by PECDAR. Inspection of the hotel by the author on one occasion verified substandard conditions, but it was difficult to see the alternatives. The two best hotels in Gaza City (Palestine and Cliff) were booked solid, and it is unknown what other better accommodations existed in the city. Complicating the situation was the impending visit of President Arafat and the resulting influx of the press and security forces.

No lunch or other meals were provided to the participants. This reflected the stated policy of the director, T&T, that the participants should be treated like "professionals"—that participants in Western courses and seminars are not usually provided meals.

Nevertheless the Director was enthusiastic about the results of the course and asked the author if the WB could repeat it as soon as possible, along with other short (1 week) courses in contracts, estimating, proposal writing, and similar applied subjects. The matter was left for further discussion in Washington. Upon return to the WB, it was discovered that an Arabic version of the evaluation form was available, and it is recommended that in the future this form be used in Arabic-speaking countries.

9.3.5 Logistics

The venue for the three-week course was the Rashad Shawa Cultural Center in downtown Gaza City. This is an imposing building, well maintained, fully air conditioned, with a large auditorium, several large meeting rooms, cafeteria space, and reception areas. The facility is fully equipped with an inventory of modern audio/visual equipment including a large screen TV. The staff was very helpful and responded quickly to any problems encountered. This facility is highly recommended for any similar training needs in Gaza in the future.

Just prior to the start of the course, the Deputy Director for Training and Technology, PECDAR, recommended that the WB utilize the services of the International Services Center (ISC), for day-to-day administrative assistance. The office is around the corner from the Cultural Center and has facilities for fax, reproduction (including transparencies), and long distance telephone. The director was very resourceful and was able to do or get most anything that might come up during a program held in Gaza, including the cashing (official) of personal or traveler's checks, exchanging of money, acting as interpreter at business establishments, and so on. Good services are scarce in Gaza, and it is recommended that ISC be considered as a resource when visiting the area.

9.3.6 Observations and Comments

The participants, on the whole, were mature professionals with significant experience in their fields. Most of them received their experience outside the Occupied Territories in Kuwait, Saudi Arabia, Egypt, and elsewhere, and had returned as a consequence of the Gulf War. They recognize that their economic well-being rested in becoming partners with foreign companies and/or competing with them in a global economy. They were anxious to learn and absorb new knowledge, particularly those skills that have direct application in their work. For example, one participant (an independent contractor) told the instructor that he had submitted a CPM (critical path method) network schedule to USAID that day for a new housing contract he had won. He said the techniques he had learned in the past week in the course was put to immediate use and that USAID was surprised and pleased at his new capability. During the last week of the course the Director for Training and Technology, PECDAR, told the participants to give him a list of the courses they would like to see in the future. The resulting list contained requests for training in contract administration, estimating, proposal writing, and general management skills.

9.3.7 Lessons Learned

The foregoing contains comments indicating specific areas with which to be concerned in future training programs in the Occupied Territories (OT). Above all it is mandatory that sufficient time be allotted to plan properly the events leading up to the course. No detail should be left unconsidered; the situation in the OT is not conducive to taking care of details due to a preoccupation with fast-moving political and economic events and a striking lack of sufficient personnel in decision-making and administrative roles. However, there is no lack of dedication and desire to cooperate if personnel are given timely suggestions and solutions to problems.

Following is an outline of the PM Course offered:

	Sunday	Monday	Tuesday	Wednesday	Thursday
A.M.	Welcome and Orientation	Project Analysis Phase	Project Objectives and Scope	Organizational Dynamics	Human Resource Management
P.M.	The Project Life Cycle	Project Analysis Continued	Organizing for Project Management	Human Resource Management	The Project Manager
A.M.	Developing the Team	Planning the Project	MS Project: Scheduling	MS Project: Tracking Progress	MS Project: Cost Control
P.M.	Communication and Leadership	Project Scheduling	MS Project: Scheduling Assignments	MS Project: Tracking Progress	MS Project: Cost Control
A.M.	Project Management Information Systems	Managing Uncertainty	Claims Management	Workshop	New Directions in Project Management
P.M.	Multiple Project Management	Risk Analysis	Forms of Dispute Resolution	Workshop	Panel Discussion and Close-out

9.4 UKRAINE

The author visited Kiev, Ukraine, during the winter of 1995. The purpose of the trip was threefold:

- To observe the opening sessions of the third phase of the World Bank (WB) Project Management Training of Trainers (TOT) program
- To make arrangements for a Procurement course
- To make arrangements to hold a Project Management Professional (PMP) Certification course in the city of L'viv

9.4.1 Training of Trainers (TOT) Program

The author attended the second day of the two-week course. It was very well organized and revolved around the analysis of an actual large project near Kiev that had problems during its construction and implementation. Over the two-week period, using the skills developed over the previous two phases (seven weeks), the participants analyzed and "reworked" the project, an automated bakery, to see how it could have been improved. An evaluation was prepared at the end of the course. In the fourth phase, five Project Management Centers will be made operational in order to train practitioners. The five centers will be located in Kiev, Kharkov, L'viv, Dnieperpetrovsk, and Nicholaev/Odessa.

9.4.2 Procurement Course

The procurement course was held in the fall of 1995. The Ukrainian cochair was of the opinion that four weeks was too long and it was agreed that the WB would send the curriculum for the previous Russian four-week procurement course to see if there was merit in adapting it to Ukraine. A maximum of 20 trainers would be involved—4 from each of five centers.

9.5 RUSSIAN TOT COURSE

The author visited Vienna, Austria, to firm up arrangements for the second phase of the second Russian Project Management TOT course that was to be held at the Joint Vienna Institute (JVI). A secondary purpose was to investigate the feasibility of future cooperation with the United Nations Industrial Development Organization (UNIDO) in areas that would be of mutual benefit. Subsequently, a meeting was held with officials of UNIDO to discuss plans for the course.

After an overview of the course, its background and expectations, it was emphasized that UNIDO needed to recommend a course design that would have about 70 percent of field visits to selected and varied enterprises in the greater Vienna area and beyond with complementary case studies and exercises. The 30 percent for lecture time would be in advanced PM topics such as management of projects in crises and special considerations in project startup. For lecturers in the latter portion, it was suggested that some candidates from Austrian project management organizations would be worthwhile to consider. WB of course would have final approval authority on course details and resource persons. It was agreed that a recommended slate of enterprises and a suggested curriculum would be submitted within a month and a budget figure for the UNIDO effort was agreed upon with an estimate of two man-months for the course.

The author then met with the chief of administration of JVI. The timing of the course was verified, as were the details of procedures for the two weeks. There would be exactly 30 lodging spaces (no more) made available for the Russian participants. Since there were 31 participants, plus the codirector and two assistants scheduled to attend the course, arrangements were made for the four extra persons to be accommodated elsewhere. A tour through the students' facilities was made and past experiences and lessons learned by JVI in their operations was discussed. A copy of the information for course directors was provided.

Subsequent to the foregoing, the author traveled to Vienna to manage this second phase of the subject course and to evaluate its performance. This phase, of two weeks duration, was preceded by a six-week course held in Moscow and was the culmination of an eight-week course overall. The program prepares trainers to design and implement courses for practitioners in project management.

The purpose of this phase was to expose the participants to Western types of business enterprises and specifically to understand how those enterprises practice PM as a matter of policy and everyday operations. Eight firms were chosen, ranging in size from small to large and encompassing activities in various industrial sectors. Planning for visits to the firms was accomplished by the author and UNIDO, with the latter making final arrangements under a contract with WB. There were no charges by the firms, and they provided lunches for all the participants. Adjunct to the visits, several workshops were arranged by the codirectors of the course, which allowed the participants to design future practitioner courses in PM in their respective cities. These workshops were held at JVI, which was also the place of lodging for the participants.

Thirty one participants formed the core group, thirty of which were from the Russian cities of Moscow, Rostov-on-Don, Volgograd, Yekaterinburg, Chelyabinsk, Kraznoyarsk, and St. Petersburg. One participant was from Dushanbe, Tajikistan. Complementing cities chosen in the first TOT program, these cities will be the locations for additional PM practitioner training centers. All of the participants were of extremely high caliber, the majority of which were engaged as university professors. Others included top management of various institutions and organizations.

Evaluations were conducted on a daily basis, culminating with an overall evaluation form, which was completed by each participant in the last hour of the course. This latter evaluation was supplemented by verbal comments elicited from each participant during the evaluation session. The daily evaluations showed, on average, a high degree of satisfaction with the presentations given at the companies visited. A total of about 60 verbal comments were made by the participants at the final evaluation session, most of which centered around the need for more practical discussions of how PM principles were executed at the companies visited. Constructive comments were also given concerning possible “game playing” being made part of the course along with some ideas for internships for selected participants at companies visited. An interesting proposal was presented concerning the participation of “graduates” of the present TOT program in future TOT courses to transfer lessons learned during the implementation of practitioner courses.

In summary, this particular phase was considered valuable in rounding out the capabilities of the TOT participants. The course not only exposed them to Western methods of PM, but also to side issues, important to an economy in transition, such as marketing, top management strategic thinking, and business procedures.

9.6 PEOPLES REPUBLIC OF CHINA

The author visited Beijing for these primary purposes: to participate in the opening of the Portfolio Management TOT program at Tsinghua University; to interview, with a Chinese counterpart, the participants; and to firm up the Washington portion of the program. The author spoke on “Human Aspects and Organizational Structures for Project Management.”

The opening ceremonies were quite impressive, with various dignitaries present to give speeches. Among those at the head table were the vice-president of Tsinghua University; the deputy division chief, Ministry of Finance (MOF); the deputy division chief, Ministry of Construction; and the writer, representing the WB.

Interviews were held in the author’s quarters afternoons and evenings. Eliminated from further participation were three candidates, resulting in a total program makeup of 29 participants and 3 others. The final number, 32, to attend the Washington portion of the course was set by the MOF, which had finally agreed to WB’s recommendation to increase the number to 40 to 45; however, their decision came too late in the program.

Discussions on the schedule and design of the Washington part of the course were held on numerous occasions in my quarters. It was finally agreed to delay the start in Washington for one month, an option welcomed by Tsinghua and MOF since the program start had already been delayed one month and they were faced with complicated processes for visas and passports during the forthcoming holiday period. Intense discussions were also held with MOF regarding WB disbursement procedures and charges and requirements for interpreters and translators. On return to Washington, the writer documented the agreements made and posed some other points. These latter points were subsequently settled.

On the author’s last evening at Tsinghua, the vice president of the university hosted a banquet with various faculty members and guests.

9.7 MACEDONIA

This course was conducted in Macedonia for Macedonian central and line agency officials and for public enterprise officials who are involved in preparation of the Public Investment Program (PIP). Government of Macedonia (GOM) officials were insistent that the course delivery and the associated reading materials be in the Macedonian language because of the limited English language capabilities of the targeted trainees. Mission interviews of the potential trainees led the Mission to concur in the decision to conduct the course in the Macedonian language.

Prior to the team departure, the expectation had been that an English-language presentation of an Investment Decision Making module that had been developed and tested over the past three and a half years would be appropriate if properly adapted to meet Macedonian circumstances, and that the timing of the Macedonia course could follow directly after the aforementioned module. The requirement that the course be delivered in the Macedonian language imposed two major changes on this original plan: The timing of course delivery had to be delayed to allow time to translate the materials into Macedonian language. Plus, the course materials would need to be divided between the core materials to be translated into Macedonian language *versus* those materials that could remain in English to serve as reference materials for those able to read English.

9.7.1 Logistics of Translating and Printing

It was estimated that approximately 300 pages of material would have to be translated and proof-read during the period February 15 to April 7. The WB consultants would then send core materials for translation via courier service in sections to maintain orderly use of translators who would be hired locally. Local experts in economic analysis and in project management would be hired for content-proofing of the translated versions of the materials. The first section of materials would be dispatched immediately upon the consultant's return to office. The bulk of the course materials would thus have to be printed locally. The exception would be a few materials to be provided in published form, such as WDR 96, *From Plan to Market,* 50 copies of which the WB would supply for the course.

9.7.2 Course Directors and Seminar Leaders

The two foreign course directors were from the WB. In addition, a senior advisor in the Ministry of Development was appointed to be the Macedonian course director, and it was requested that a second senior advisor in the Ministry of Development be appointed as the Macedonian deputy director for the course. It was expected that all sessions would be led by these four course directors. In addition, course participants would be called upon for brief presentations and to lead some short sessions during the course. The opening session would be conducted by the minister of Development (or by the deputy minister in his absence).

9.7.3 Course Participation and Participant Selection

Participants for the course came from 10 or more ministries and associated enterprises. Selection of participants were overseen by the Macedonian course directors and their associates in the Ministry of Development from nominations submitted by managers in the agencies involved in PIP preparation. Nominations and selection were according to criteria specified by the mission, including the following:

- Involvement in PIP preparation.
- High enough level to affect changes in PIP processes as they may be identified from the course and follow-up activities.
- Able and willing to participate full-time for two weeks. It was agreed to have 30 full-time participants and 10 observers, with some observers being high-level officials unable to commit to full-time participation and others being potential trainers from universities.

9.7.4 Macedonian Work-Day and Class Times

Class times were set so as to accommodate demands imposed upon higher level officials by regular work activities which were ongoing. Within a GOM workday from 7:00 A.M. to 3:00 P.M., the course would last from 7:30 A.M. to 1:00 P.M. to allow some time in office at the end of the class day to handle urgent official duties.

9.7.5 Certificates and Course Evaluation

It was requested by GOM that WB certificates of course participation be awarded at the end of the course. The author agreed to take up this matter with the WB to determine whether printed and signed certificates might be hand-carried to Skopje, with participant names to be applied by a calligrapher. It was agreed that the end-of-course evaluation should be a Macedonian product and that drafting of the evaluation would be accomplished by the Macedonian course director and deputy director. Assistance would be given by WB course directors by providing samples from WB activities and by serving as advisors to the drafting process.

9.8 SUMMARY

The foregoing is an attempt to illustrate, by examples, the various considerations that must be taken into account by training organizations and trainers engaged in the international sector. Paramount is the need to recognize the importance of the cultural aspects of the audience participants, their probable individual needs, and the historical background of the country. Of equal importance is the need for administrative controls, particularly regarding logistics, communications country to country, and unexpected emergencies such as medical and personal problems.

CHAPTER 10
CROSS-CULTURAL PROJECT MANAGEMENT ON MAJOR-SIZED GLOBAL OIL AND GAS PLANT PROJECTS

Hiroshi Tanaka

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10.1 INTRODUCTION

Oil and natural gas development and processing facility projects (oil and gas plant projects) planned, engineered, and constructed for owner companies, by international prime contractors forming joint venture or consortium project organizations (collectively referred to as JV) are an increasingly common project execution format in the contemporary engineering and construction (E&C) industry.

JV projects pose many challenges, such as balancing the interests of original competitors in the industry that form partnerships as JV partners. The complexity of project execution is due to many corporate and geographical component's participation in the project organization and the tug-of-war of cultures brought in by JV partners. If managed well through solid teamwork, these projects yield extensive returns: reasonable profit for all the partner contractors, greater owner satisfaction, win-win cooperative spirit among the partners, in-depth global project operations know-how, cross-fertilization among partners and enhanced cross-cultural skills among partner employees—all of which lead to the healthy growth of the E&C industry.

This chapter discusses the dynamism and delicacy of cross-cultural and interactive project management in a JV structure, based on the JV project experience of a leading Japanese global E&C

contractor to which the author belongs. Discussions are primarily developed from the standpoint of contractors of which basic business function is to provide project implementation and management services for a fee for owners. As such, the terms, contractor(s), E&C contractor(s), or Engineering-Procurement-Construction (EPC) contractor(s), when context requires, are used throughout this chapter.

10.2 VALUE CHAIN OF OIL AND GAS PLANT PROJECTS

One of the crucial issues to enhance the venture value of major oil and gas plant projects is to fine tune the value chain of project development, planning, and execution (Tanaka 2006). Figure 10.1 depicts a typical value chain of an oil and gas plant project.

10.2.1 Project Development Stage

The project development stage consists of the project conception and feasibility study phase and the project definition phase. The project conception and feasibility study phase culminates in the identification of goals and objectives of the project, in this case investment in an oil and gas plant, preliminary project scheme, economics, stakeholders participating in the project, risk level and strategy for project development, and execution. When the work for this phase is completed and good indications of project feasibility exist through the first investment gate review, the owner project team presents a project proposal to the management of the owner organization to obtain approval for proceeding to the next phase.

The project definition phase is a preamble to project implementation and explores detailed feasibility and definition of the project. Project definition work is normally undertaken by a consulting firm or an international E&C contractor broadly experienced in this type of project development; such a company works as a joint team with the owner. This work may also be carried out by a JV project organization.

The owner, assisted by a consultant, carries out front-end engineering, also called basic engineering, which produces a facility definition package. Based on this, the owner establishes a budget and cash flow forecast and a project master execution plan, including contracting strategy for the

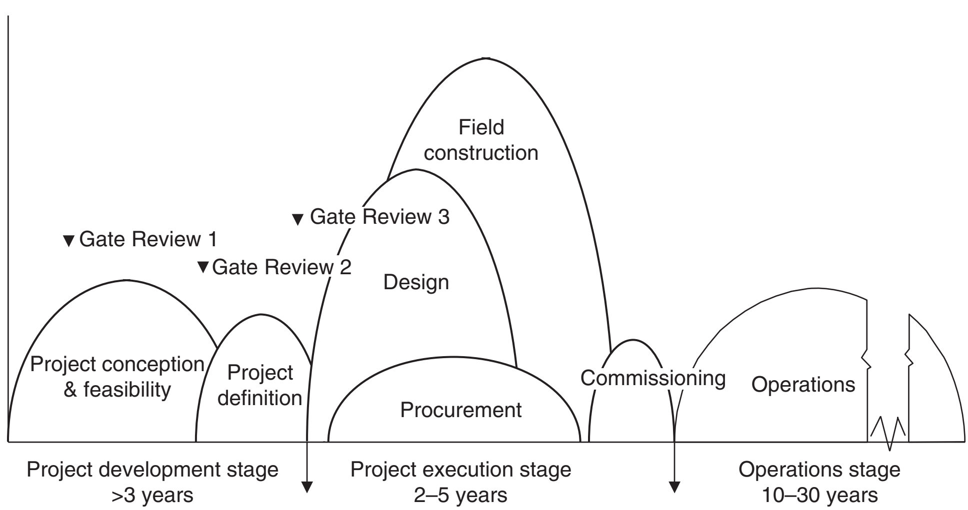


FIGURE 10.1 Typical supply chain of an oil and gas plant project.

project execution stage that is also called the EPC stage. At the end of this phase, if the results of international bidding have cleared the criteria for the final gate review of investment, an EPC contractor is selected by the owner.

On oil and gas plant projects, suppliers of production technology, referred to as *process design* in the industry, are extensively employed and form a part of the supply chain.

10.2.2 Project Execution Stage

In the project execution stage, based on the master project execution plan and facility definition package produced in the previous stage, project execution efforts are carried out in full swing and the project gradually takes on physical shapes in terms of engineering design, procured equipment and materials, and erected facilities. Most of the work in this stage is performed by the EPC contractor. JV project organizations are formed mostly for this stage of a project.

Project management processes are most intensively deployed during this stage to direct the total project work as well as monitor, forecast, and control work scope, quality, project schedule, and costs. The value of project management is severely tested as this stage involves highest invested costs and hence assorted risk.

In this stage, a number of parties participate in the project as engineering design subcontractors, equipment and materials suppliers (also called vendors), construction subcontractors, and specialty consultants. They are also supply chain contributors.

10.2.3 Operations Stage

The mechanical completion of the plant formerly meant that the major player was switched from the contractor to the owner. However, more owners today tend to require the contractors' involvement beyond this traditional plant turnover point, retaining contractors up to the state of the plant being ready for startup or even for completion of the confirmatory testing of the plant in meeting the planned performance. As the supply chain of oil and gas plant projects increasingly emphasizes life cycle facility management to reap the benefit of total optimization of the venture, contractors' involvement in operations and maintenance services are increasing.

In summary, the involvement of project management, especially that of contractors, has been mostly in the project execution stage. However, as both owners and contractors have tried to reap combined expertise and experience to enhance project viability and optimize project plans, chances of experienced contractors' involvement in the project development stage are increasing, so project management is afforded opportunities to expand into upstream project work. Likewise, opportunities now exist for contractor project management to be involved in the operations stage.

10.3 RATIONALE OF JOINT VENTURE PROJECT ORGANIZATIONS

This section defines a JV project organization and discusses why it is formed, plus the advantages and disadvantages of JV project organizations (Akiyama and Tanaka 2002).

10.3.1 Definition of a JV Project Organization

A JV project organization is one of the alliance schemes of two or more contractors, and it is employed widely for large projects, mostly those in excess of U.S. $300 million in EPC contract amounts. While the term *JV* refers to an incorporated joint venture company in many industries, in the E&C industry, it refers to an unincorporated joint project organization that shares a single or significantly common fund and project performance liabilities and bears joint project execution responsibility to the owner. An exception is that on very large projects, partner contractors may develop a specific project corporation in a neutral country for the sole sake of "one-shot" execution of a particular project.

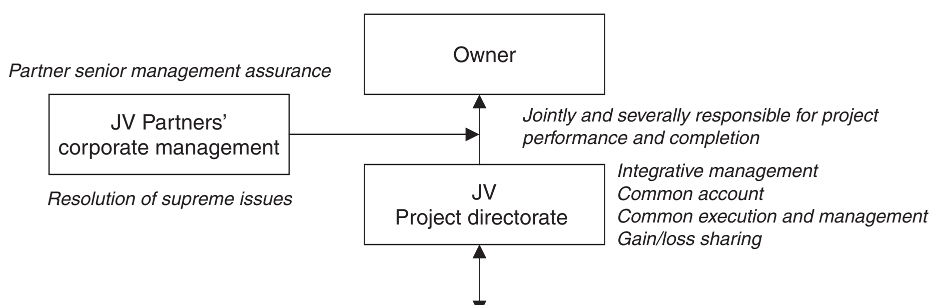
A similar collaboration format among contractors is a *consortium*. For this scheme, a clear division of work for each partner contractor is defined and consortium partners are individually responsible for the defined scopes. In other words, the consortium scheme can be employed only if clear divisions of work responsibility can be defined prior to the initiation of the project.

Figures 10.2 and 10.3 show the structures of a typical JV and consortium project organization, respectively.

10.3.2 Rationale for JV Project Organizations

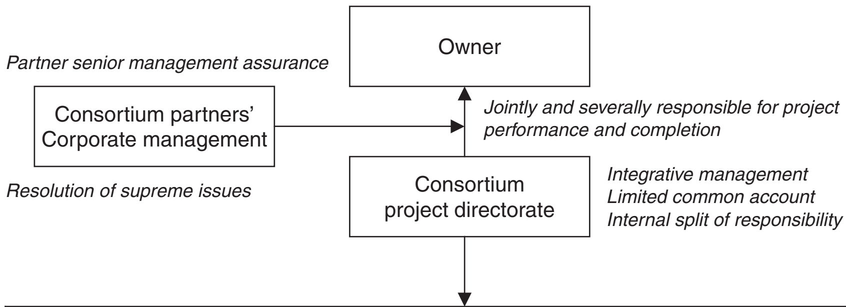
The formation of a JV project organization is preferred if the project requires a wide variety of expertise that could better be filled by a group of contractors; involves high technical, commercial, or political risks that a single contractor finds difficult to bear; demands multicountry export credit finance packages that normally require the involvement of reputable contractors from providing countries; or requires highly secure assurance to complete major-sized projects. In some cases, forming a multinational JV project organization is given by the owner as a prerequisite for bidding on its projects.

JV contractors often contract for projects worth several hundred million to billion U.S. dollars. Assurances for completion of such projects is of paramount importance for all the project stakeholders. Often, sales from these plants represent a significant portion of national revenues for developing countries. While a single contractor may be able to undertake such large projects, project owners might demand enhanced assurance of timely completion to cover expected or unexpected, extraordinary circumstances.



	Partner A	Partner B	Partner C
Project management	Responsible for its operations center	Responsible for its operations center	Responsible for its operations center
Engineering	Responsible for main plant on behalf of JV	Responsible for auxiliary facilities on behalf of JV	Responsible for auxiliary facilities on behalf of JV
Procurement	Geographical coverage of procurement sources (continents) or nominated main role by one and subroles by others, on behalf of JV		
Construction	Amalgamated site operations or nominated main role by one and subroles by others, on behalf of JV		

FIGURE 10.2 Joint venture project organization structure.



	Partner A	Partner B	Partner C
Plant responsibility	Plant I	Plant II	Plant III
Project management	Responsible for its scope	Responsible for its scope	Responsible for its scope
Engineering	Responsible for its scope	Responsible for its scope	Responsible for its scope
Procurement	Responsible for its own plant scope, or alternatively responsible, on a geographical basis, for specific procurement sources (continents)		
Construction	Responsible for its own scope, or alternatively amalgamated site operations		

FIGURE 10.3 Consortium project organization structure.

A JV project organization comprising two or more contractors would provide additional performance and completion assurance since all the JV partners are jointly and severally responsible for project outcomes to the owner, and other project stakeholders such as financiers, and the JV's combined technical and commercial competence and risk tolerance capabilities are greater.

10.3.3 Partners in JV Project Organizations

Partners in JV project organizations vary on each project. Some contractors collaborate for just one project and thereafter compete with each other for other projects, while some two contractors form an alliance agreement for exclusive JV relationships on all the projects in specific area(s) of expertise, such as natural gas liquefaction (LNG) plant projects. Even in this case, the two companies may compete in other areas of project expertise.

Contractors have proved that this flexibility of partnership has enhanced the overall capabilities of the total E&C industry. One of the primary factors that enables this flexibility is the basic commonality of project execution and management methodologies adopted by a first tier of global contractors; unlike in other branches of the industry, there is lower national influence of business models. Because of this commonality, Japanese global contractors have long formed JV project organizations with their American or European industry colleagues, but they have recently started teaming up with Japanese companies as well.

10.3.4 How Extensively JV Project Organizations Are Used

JV project organizations are frequently used on projects to engineer and build LNG plants, other large natural gas processing plants, and grassroots refineries of which investment costs exceed U.S. $300 million; in particular, a great majority of LNG plant projects are contracted with JV groups—typically groups of contractors that are combinations of Japanese and American and/or European contractors. There is a unique case of a Nigerian LNG project in which the JV project organization consists of a U.S., French, Italian, and Japanese contractor.

Table 10.1 presents the experience in JV operations (including consortium operations) completed by or ongoing at JGC Corporation, a leading Japanese E&C contractor.

10.3.5 Japanese Compatibility with JV Project Organizations

To the Japanese, English is, of course, a second language and their business cultures are different from those of Westerners. However, these factors do not pose major problems. In fact, Japanese project managers and team members are often more flexible in thinking and can play a greater role in teamwork than their Western counterparts, as teamwork is a traditional style of work and problem-solving in Japan. It has been proven that the Japanese are particularly good at coordinating different views and practices and integrate the required project efforts. This fact is demonstrated in Table 10.1, which indicates that in a majority of JGC's JV operations, especially until the 1990s, where JV project organizations were rather selective, JGC took the project leader role.

10.3.6 Advantages and Disadvantages of JV Project Organizations

The most significant advantage of JV project organizations is that since positive contribution of all the partners results in enhanced success of the project and brings more profit for all the partners, partners are automatically aligned to the same objectives—namely, successful completion of the project to the satisfaction of project stakeholders. Each partner has its own strengths and areas of expertise, and by combining such wider project intellectual resources, both the JV partners and the owner can reap the combined benefits in terms of much enhanced overall capabilities to complete the project.

On the other hand, disadvantages may be experienced if JV partners agree to work together without knowing each other well or international partners do not incorporate the necessary added measures to reinforce the capability of a partner from a project host country. In some projects, an international contractor suffers considerably due to unexpected substandard performance of its partners from host countries or from third countries, yet due to the JV structure, such an international contractor is jointly responsible for the overall performance to meet contractual obligations; this means the company must bear escalating extra costs by expending its own resources for what was originally its partner's work.

10.4 JV MANAGEMENT STRUCTURE

Central points for consideration in JV management structuring include the following:

- Optimum structuring of a JV project organization
- Function design of a JV project directorate
- Scopes of work for the respective JV partners, hence, project operations centers
- Balanced sharing of project management responsibility between the project directorate and the management of the respective project operations centers

TABLE 10.1 Joint Venture/Consortium Project Experience of a Japanese E&C Contractor

Country	Project type	Partner nationality	JGC as leader	Completion
Korea	Refinery	USA	X	1969
Brunei	LNG	USA	X	1973
Brunei	LNG	USA	X	1975
Malaysia	LNG	USA	X	1984
Australia	Gas Plant	USA, Australia		1985
Argentina	Refinery	Argentina	X	1989
Nigeria	Refinery	France	X	1989
Australia	LNG	USA, Australia	X	1989
China	Offshore Oil Production	UK		1988
Indonesia	Oil Production	Indonesia	X	1989
China	Offshore Oil Production	UK		1988
Pakistan	Power Plant	Germany, Switzerland	X	1991
Australia	LNG	USA, Australia		1992
Iran	Refinery	Italy	X	1993
Turkey	Refinery	Turkey	X	1993
Indonesia	Refinery	UK	X	1994
Nigeria	NGL Recovery	USA, France		1992
Nigeria	Petrochemical	Italy		1994
Malaysia	Refinery	Malaysia	X	1994
Malaysia	LNG	USA	X	1996
Nigeria	NGL Recovery	USA, France, France		1997
Nigeria	LNG	USA, France, Italy		1999
Indonesia	Petrochemical	Malaysia		1998
Indonesia	Refinery	Indonesia	X	1998
Qatar	LNG	USA	X	2000
Malaysia	LNG	USA		2005
Indonesia	Oil Production	USA	X	1998
Nigeria	Natural Gas	Italy, Fance	X	1999
Uzbekistan	Refinery	France		1997
Australia	Copper Production	Australia		1999
Argentina	Natural Gas	Italy, Argentina	X	2002
Venezuela	Heavy Crude Oil Processing	Venezuela, Venezuela	X	2001
Nigeria	LNG	USA, UK, France, Italy		2002
Singapore	Petrochemical	Singapore		2002
Malaysia	LNG	USA, Malaysia	X	2004
Algeria	Oil Production	Spain	X	2003
Venezuela	Refinery	Japan, Venezuela	X	2004
Australia	LNG	USA, Australia		2004
Indonesia	Offshore Oil Production	Indonesia		2004
Algeria	Natural Gas	UK		2004
Egypt	LNG	USA, Spain		2004
Libya	Natural Gas	Italy, Farnce	X	2004
Nigeria	LNG	USA, France, Italy		2005
Algeria	Natural Gas	USA		2005
Iran	Natural Gas	Japan, Iran, Korea		Ongoing
Nigeria	LNG	USA, France, Italy		Ongoing
USA	Petrochemical	USA	X	Ongoing
Indonesia	LNG	USA	X	Ongoing
Vietnam	Refinery	France, Malaysia, Spain		Ongoing
Qatar	GTL	USA	X	Ongoing
Yemen	LNG	USA, France		Ongoing
Algeria	LNG	USA		Ongoing

10.4.1 Structuring a JV Project Organization

A specific JV project organization structure is shaped considerably during bidding or even preproposal stages. As examined earlier in the section "Value Chain of Oil and Gas Plant Projects," initial contractor involvement in the project value chain tends to move upstream. This means that a JV operation could well start in the project definition phase in which a JV project organization carries out front-end engineering for an owner under a separate contract with or without an option for conversion to a subsequent EPC contract. This holds true of all the LNG plant projects that are a predominant investment in the current global E&C market. Even if this is not the case, a basic structure of a JV project organization is molded over an extended bidding period that may last from six months to one and half years as counted from the owners' first call for contractor prequalifications for bidding.

Factors that influence JV project organization structures, including the nomination of a leader company, comprehend both commercial and technical elements. For instance, a typical factor is the necessity to arrange for financing by multiple export-credit agencies (ECAs) in order to meet an owner's extensive financing need; partner contractors from source countries of ECA financing are usually invited to form a JV project organization. Other factors are the compliment of required technical competence through joint efforts, track records on similar projects, local knowledge of the plant location, and experience with the owner possessed by one partner that influences who should take a leading role.

10.4.2 JV Project Organization Format

JV projects are characterized by a global spread of the project organization, requiring rigorous integrative management of transnational project operations; two-tier project management structure in the organization; and wider sourcing of project resources such as financing, engineering forces, and materials and erection forces.

Figure 10.4 presents the spread of project operations centers, branch offices, and major suppliers all around the world on an LNG plant expansion project in Malaysia.

FIGURE 10.4 Global reach of a joint venture operations.

This major project, in excess of U.S. $1 billion in the contract amount, was completed in 2005 by a JV formed by a Japanese contractor, an American contractor, and their Malaysian affiliate companies. The two global contractors had a previous, close collaboration relationship, including JV project organizations on similar projects. The leader role was taken by the Japanese contractor with due consideration given to its proven experience with the owner, geographical proximity to the owner, and business alliance policy among the two companies setting out collaboration on a geographical basis. Thus, the project headquarters was located at the Japanese contractor's home office in Yokohama, Japan; the American contractor's home office in Houston, Texas; two company's joint operations office in Kuala Lumpur, Malaysia, and the site office in Sarawak, Malaysia, were nominated as the project operations centers. Further, the two companies' European offices in London and The Hague also participated in the project as procurement offices.

A sample JV project organization is provided for the same LNG project in Malaysia in Figure 10.5.

The project organization consisted of the JV project directorate located at the host project operations center in Japan and the participating project operations centers distributed around the globe. The respective operations centers were responsible for their part of project management, engineering work, procurement work, and construction work according to the JV agreement and on behalf of the JV.

10.4.3 Project Leadership and Decision-Making

Staffing on the project directorate level is a true mix of employees from the JV partners. All the primary project leadership, ultimate responsibility, and hence decision-making for project management and operations, and resolution of major issues, reside with the project directorate, which is

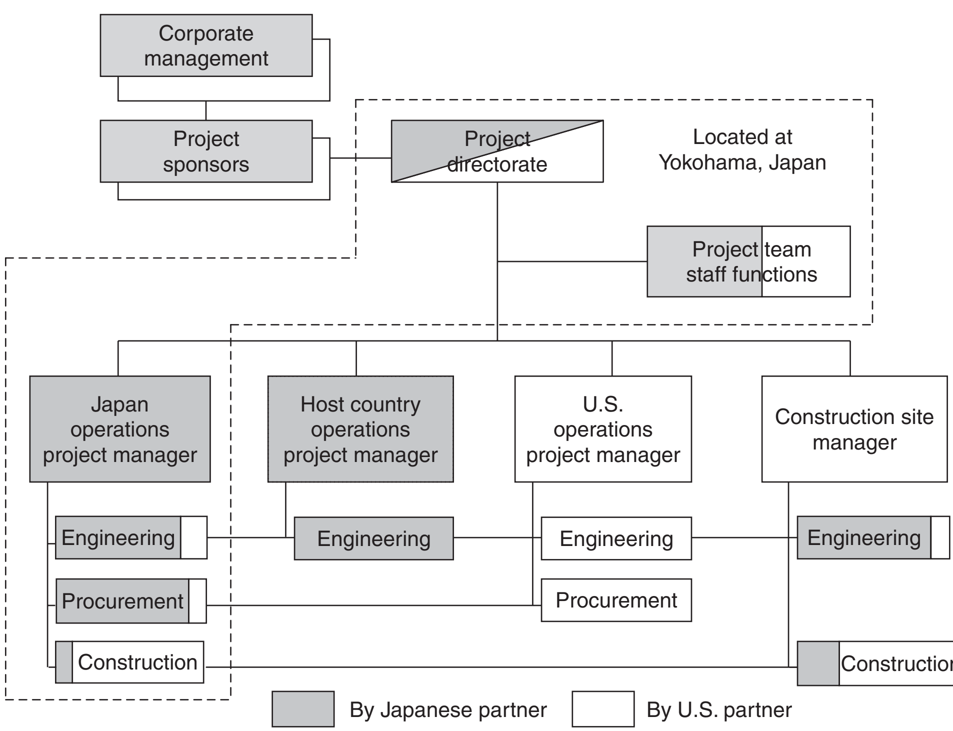


FIGURE 10.5 A joint venture project organization.

formed by representatives of all the partners. One of the partners represents the JV project organization as the JV project director to the owner and other project stakeholders, whereas the other partners staff deputy project director(s). In some cases, the nominated representative of the JV rotates across the project phases—for example, the home office phase versus the construction site phase.

The project directorate basically adopts a unanimous agreement rule for all critical decisions, which requires truly essential trust of each other. Since each partner has a different corporate policy, views, and interests, the operation of a JV project organization requires extensive discussions for alignment and brainstorming efforts to reach a unanimous agreement. The project directorate members may consult, from time to time, their corporate management for corporate policy on the issue in question. Normally, on top of the JV project directorate, JV partners' corporate project sponsors are nominated from the respective board members for ultimate decision-making and resolution on highly critical issues.

The project directorate is seconded by project control and administrative staff who take charge of total project controls and overall administrative services.

10.4.4 Project Operations Centers

The number and locations of project operations centers are decided for each project phase or at least the group of engineering and procurement phases, often referred to as the home office phase and the field construction phase, and considering the split of work among the partners. Usually, the project directorate forms a focal point of all communications between the JV project organization and the owner.

10.4.5 Amalgamated Operations

JV project organizations are based on purely amalgamated operations. First, all the JV partners are jointly and severally responsible for project performance and completion to the owner, which encourages the partners to share all the liability, assign specific scopes of work to the most suitable partners, and tax overall optimization and synergy effects. While scopes of the respective partners' work are agreed upon in the JV project organization, assigned work is performed on behalf of the JV and not for individual partners themselves.

Next, in terms of commercial aspects, JV project organizations are unique in that a joint operation account is established and is operated as if the JV project organization were an independent company. For this, an open account system is adopted by which all the payments from the owner are pooled in that account, and all the disbursements, such as costs of materials and services as well as expenses, on behalf of the JV partners are also made from the same account.

Upon completion of the project, the partners would share the residual amount in the JV account. In cases where a deficit is experienced, the partners are to make up the loss in the same manner. This practice means that only those contractors that have globally compatible accounting and governance practices are eligible for JV organization opportunities.

10.5 *PROJECT MANAGEMENT FEATURES*

This section reviews features of project management peculiar to JV project organizations other than the organizational management discussed in the previous section.

Project management on JV projects offers the following characteristics:

- Integrative management of transnational operations
- Harmonization of project procedures
- Control of globally diverse resources procurement and deployment
- Elaborate team building
- Risk management based on combined experience and know-how

10.5.1 Scope Management

Scope definition and management are carried out as for ordinary projects. Global contractors possess extensive Work Breakdown Structure (WBS) systems that offer 10 levels or larger and are structured for global collaboration of parties involved in a project, features of which facilitate communications among parties and allow quality definition of a project and clearer division of work.

Scope splitting among operations centers depends on both technical and commercial parameters; the baseline is to choose the division of the work that is best for the entire project. Usually, all the partners are aligned to the project and motivated to pursue harmonization since the success of the project will benefit all the partners. But this cannot be expected without a well thought out communications system among all the operations centers.

10.5.2 Project Procedures

Each JV partner has its own business practices, manuals, and procedures, and they are all different from each other. For JV operations, it is necessary to consolidate these practices. This is particularly true for meeting the requirements of ISO 9000 Management Standard series, mostly mandatory in the E&C industry. It takes considerable time and effort to consolidate discrete practices and develop project-specific manuals and procedures. A solution is to use the manuals and practices of the host project operations center as basis to produce common documents.

10.5.3 Project Management Standards

Global oil and gas plant projects utilize the E&C industry's own project management methods. There are no marked differences among methods used by major contractors; as such, a project leader company's method is used on JV project organizations as basis and project-specific tailoring is carried out to suit a particular JV project. Multinational owners may specify some hold points for JV project management procedures.

10.5.4 Cost, Resource, and Time Management

Global contractors share international E&C industry practices on costs, resource, and time (CRT) management. Integration among the partners in these management domains, therefore, focuses more on policy than practices.

Use of the industry's de facto planning and scheduling tool facilitates integration of project schedules, whereas usually the partners mutually rely on their management systems and procedures for resources and costs management, except that common budget and control formats are utilized.

Once the project master schedule and cost budgets are settled among the partners, controls are the responsibility of the respective operations centers with monthly progress being reported to the project directorate. Where progresses reveal problems that may affect the overall performance of the project, such problems, together with corrective action plans, are escalated to the project directorate for special attention.

10.5.5 Quality Management

A main issue in quality management is the integration of project manuals and procedures to meet ISO 9000 requirements as mentioned. Also, challenge to total quality management (TQM) may be required depending on the contractual terms.

10.5.6 Risk Management

Intensive risk assessment sessions are held among the JV partners during the bidding stage and project planning phase after contract award. All the partners' risk management experience and relevant operating know-how are injected. During the project execution, cross-scope project review among the JV project directorate members provides a vehicle of cold-eye progress evaluation and risk identification.

10.5.7 Safety, Health, and Environment (SHE) Management

Safety, health, and environment (SHE) management is given high priority on oil and gas plant projects. This management calls for the application of internationally recognized management systems such as ISO and conformance to the owner's SHE requirements. Some elements of SHE management should be incorporated into the design and execution of the engineering, materials procurement, and field construction. More and more JV projects assign a JV SHE manager (or coordinator) who sets the overall project SHE management policy and coordinates SHE management efforts carried out at the respective operations centers.

10.5.8 Communication Management

JV organizations typically present a low context communication culture even though partners know each other well. Elaborate communications among all the operations centers are critical. The most important points are trust, openness, and willingness to build constructive relationship among the JV partners and between the JV project organization and the owner. For this reason, both the owner's and the JV's management teams should be collocated.

A variety of measures are implemented to maintain swift and accurate communications among the participants in the project. Cascaded, virtual, or face-to-face sharing of project directorate instructions, project communications, and project information and data by means of formalized coordination and communication manuals, team-building sessions, and robust communication systems based on state-of-the art information and communication technology (ICT) are the lifeline of the project.

Since quite a few project members and other project stakeholders of many nationalities participate in JV project organizations, team building is an essential ingredient of project success, and it requires continuous attention by all the participants. Team-building sessions are normally hosted at the outset of the project and at one or two key project milestones, in which the owner project team members and the JV project organization's key project members work together at outside facilities for concentrated discussions and familiarization. A specialist team-building consultant and a TQM coordinator are assigned as required by contract terms or project-specific consideration. Team-building sessions are intended to define or confirm and positively agree upon the fundamental objectives and strategy of the project and understand how to work together in a most efficient and interactive way to achieve such objectives. Also, challenge targets to improve project performance are agreed upon between the owner and the JV project organization.

10.5.9 EDMS-Based Configuration Management

JV projects costing hundred millions to billions in U.S. dollars involve a huge number of documents. An electronic data management system (EDMS) enhances project work efficiency, especially in configuration management. The up-to-date design information and documents can be shared by project members concerned in all the operation centers simultaneously, thanks to an EDMS.

10.5.10 Construction Planning to Design Using Multidimensional CAD

On oil and gas plant projects, constructability assessment—assessing practicability of erection—during the design phase is important. The current industry trend is to utilize three-dimensional computer assisted design (CAD) software to plan construction operations by means of CAD-assisted simulation techniques. On some projects, 3-D CAD systems added with time analysis function, often referred to as 4-D CAD systems, are used that enable coupling of the simulation of construction planning and time scheduling.

10.5.11 Global Resources Procurement Management

Procurement management in JV project organizations is an extensive effort in that hundred millions of dollars' worth of materials are procured from all over the world; procurement entities, or JV partners engaged in procurement, are plural; elements of procurement efforts transverse partners; and critical procurement items require the JV project directorate's approval.

On many JV project organizations, procurement efforts are shared by partners on a geographical split basis—for example, a U.S. partner is charged with the North American market, a Japanese partner takes care of the Asia-Pacific and Indian Subcontinent market, and a European partner covers the European market. To support such extensive procurement operations, a JV project organization selects one of the proprietary materials management systems owned by partners for common use or alternatively uses plural systems independently and feeds summary reports in a unified format.

10.5.12 Executive Project Review Meetings

JV projects host executive project review meetings often labeled as "CEO meetings" or "project sponsor meetings" once every three to six months in addition to monthly project review meetings at the project host operations center. These executive meetings are intended to maintain high-level involvement of an owner's and JV partners' senior management in the project. As such, the meetings oversee progress of the project and resolve critical issues that affect project performance. Usually such meetings rotate from principal operations centers, to owner headquarters, and to a site operations center to enhance the spirit of harmony.

10.6 LESSONS LEARNED

To international contractors, JV project organizations have become part of ordinary business scenarios. While JV project organizations pose many challenges, this structure is a driver for sound growth of the E&C industry as it offers great win-win opportunities among E&C contractors. Primary lessons learned from JV project organizations are summarized here.

10.6.1 Business Capacity Building

Affinity with JV project organizations expands business opportunities for contractors. Well-managed JV projects have contributed considerably to contractors' business capacity building in terms of turnover, profit, and track record.

10.6.2 Risk Abatement Mechanism While Increasing Business Volumes

While JV project organizations are not free from risk, they offer higher opportunities for contractors to contain major risk while they are tackling large-scale projects by reinforcing risk tolerance capacity.

10.6.3 Cross-Fertilization

JV projects not only enhance success possibilities, but they offer invaluable opportunities for cross-fertilization among participating contractors in such aspects as the following:

- Acquiring new technical expertise that would otherwise not be feasible on an accelerated manner
- Experiencing partners' project execution or management methods with worthwhile benchmarking
- Being exposed to partners' unique business strategies and negotiation techniques

10.6.4 Capacity Development of Contractor Global Project Talents

JV project organizations offer ample opportunities for employees of partners to master step-by-step operations of transnational projects and gain knowledge of cross-cultural interaction with their partner counterparts in the same project team. In particular, flexibility and management skills naturally do not accrue overnight. Japanese project managers and project team members have realized the importance of the following:

- Self-standing, professional project management capabilities
- Mutual respect among international players and give and take in the interest of cross-fertilization
- Clear language, though not simply English itself
- Avoidance of excessive dependence on counterparts
- Challenge to innovations; one project, one or more remarkable innovations

10.6.5 Message to Other Project Management Application Areas

The global project management community is witnessing a growing number of projects managed across national borders. Concurrent development and manufacturing of aircrafts in plural countries as shown in the Airbus example in Figure 10.6, offshore procurement of software development, and transnational supply chains in new product development are good examples.

If asked whether the E&C industry's JV and other transnational project management practices are transportable to other industry branches, the following first-hand comments are offered.

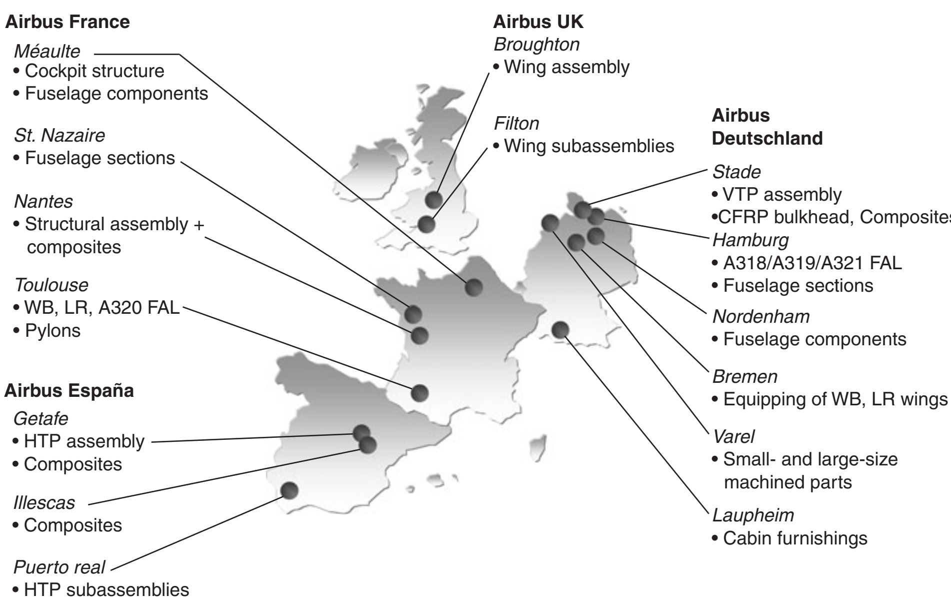


FIGURE 10.6 Concurrent aircraft manufacturing at Airbus S.A.S. in European countries (*Source:* Maria Romanova, Ph.D., 2004).

Primarily, JV project management practices should be good reference models for these newly emerging transnational collaboration project fields. But care should be taken to pay attention to sizes and details required in specific application areas.

Aircraft manufacturing projects and supply chain projects should be similar to oil and gas plant JV projects if we allow for differences in sense of time. The following practices are transportable to such other application areas:

- Joint venture project management structure, cascading project directive communication methods through two tiers, namely a central project directorate and distributed project operation centers
- Objective WBS structures considering multipartner collaboration
- JV team-ware with heavy documentation management features
- Global resources procurement and tracking systems
- Sponsor project review meetings

10.7 ACKNOWLEDGEMENTS

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PROJECT MANAGEMENT GOVERNMENT ORGANIZATIONS

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CHAPTER 11
ELEMENTS OF SUCCESSFUL PROJECT MANAGEMENT AT THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

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Thomas R. Rhodes is an Information Technology Specialist in the Information Technology Laboratory at the National Institute of Standards and Technology (NIST). He has more than 30 years of experience in software and computer systems research, development and project management, both in government and private industry, and he has published and presented many papers and reports on his work. Currently, he is program manager of the NIST Trustworthy Software Program after serving as project leader for the NIST HealthCare Standards Landscape project (www.nist.gov/hcsl), developing a Web-based capability for publishing and searching for healthcare standards information on the Internet. Earlier projects include developing and evaluating standards and technologies for e-commerce and supply-chain integration, interactive Web-based learning systems, distributed systems infrastructures, integrated software engineering environments, and design and development of computer networks and integrated systems. He is a member of the Institute of Electrical and Electronics Engineers (IEEE) and has participated in various standards, government, and industry groups including the ANSI Healthcare Information Technology Panel (HITSP) and the Healthcare Informatics Standards Board (HISB), the presidential e-Gov Consolidated Health Informatics (CHI) group, the National Electronics Manufacturing Initiative (NEMI) Factory Information Systems (FIS) group, the CommerceNet Electronic Commerce Framework Group (eCo), the Instructional Management System (IMS) Technical Developers Group, the IEEE Learning Object Metadata Group (LOMG), the IEEE Software Engineering Group, the Object Management Group (OMG), and the European Computer Manufacturers Association (ECMA) Portable Common Tool Environment (PCTE) group. He has an electronic engineering degree from Pratt Institute and did graduate work in mathematics at American University.

11.1 INTRODUCTION

The National Institute of Standards and Technology (NIST, www.nist.gov), founded in 1901, is a nonregulatory federal agency within the U.S. Commerce Department's Technology Administration (www.ta.doc.gov/). NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. From automated teller machines and atomic clocks to mammograms and semiconductors, innumerable products and services rely in some way on technology, measurement, and standards provided by NIST.

NIST carries out its mission through four cooperative programs:

- The NIST Laboratories (www.nist.gov/public_affairs/labs2.htm) conducts research that advances the nation's technology infrastructure and is needed by U.S. industry to continually improve products and services.
- The Baldrige National Quality Program (www.quality.nist.gov/) promotes performance excellence among U.S. manufacturers, service companies, educational institutions, and health care providers; conducts outreach programs; and manages the annual Malcolm Baldrige National Quality Award, which recognizes performance excellence and quality achievement.
- The Manufacturing Extension Partnership (www.mep.nist.gov/) is a nationwide network of local centers that offer technical and business assistance to smaller manufacturers.
- The Advanced Technology Program (www.atp.nist.gov/) accelerates the development of innovative technologies for broad national benefit by cofunding R&D partnerships with the private sector. (This program is phasing out; no new awards are being made).

NIST employs about 2,900 scientists, engineers, technicians, and support and administrative personnel. About 1,800 NIST associates complement the staff. In addition, NIST partners with 1,400 manufacturing specialists and staff at nearly 350 affiliated centers around the country. NIST has a budget of about $930 million and operates at two locations: Gaithersburg, Maryland (headquarters), and Boulder, Colorado (www.boulder.nist.gov/). Figure 11.1 shows NIST's organizations, associated directors, and managers.

Each of the eight NIST measurement and standards laboratories responsible for conducting the scientific and technical work are shown in Figure 11.2.

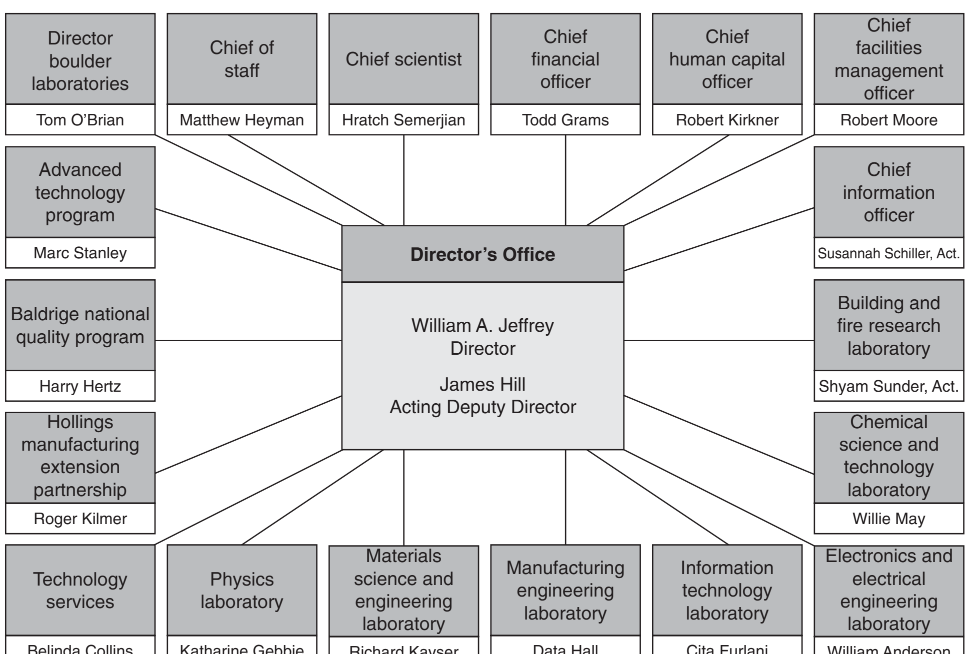

FIGURE 11.1 NIST organization.

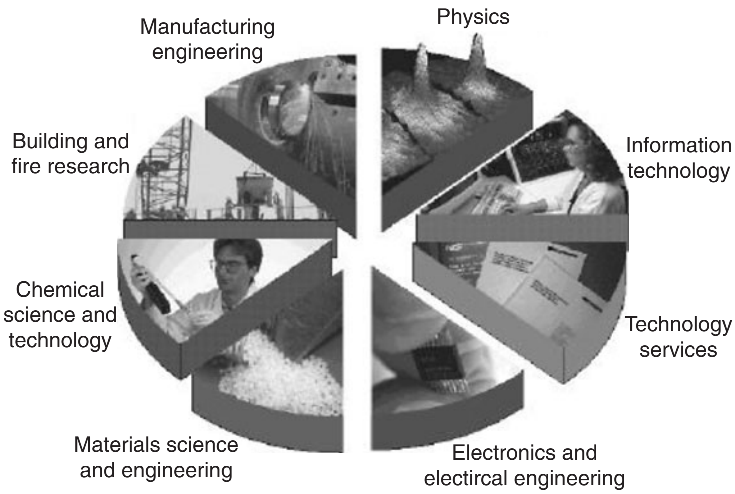

FIGURE 11.2 NIST measurement and standards laboratories.

NIST's work encompasses a full range of scientific and technical activities, including basic and applied research, engineering, development, testing, demonstration and evaluation of new and emerging technologies, measurement methods, standards, materials, and processes. This work is consistent with NIST's mission and is driven by broad national priorities, the U.S. Commerce Department's priorities, presidential and congressional directives, and recommendations by other government agencies, inter-agency working groups, industry customers, and various technical and advisory bodies.

A key role for NIST is collaborating with industry, academic, and government partners in developing and testing new technologies, methods and standards in disciplines that include manufacturing, materials science, information technology, security, communications and networking, building and fire research, chemical science, biotechnology, physics, measurement sciences, electronics, electrical, and optical technologies, nanotechnology, and quantum physics and computing.

NIST staff participates in various national and international scientific, technical, and standards' organizations to promote scientific, technical, and standards development, including the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC), American National Standards Institute (ANSI), International Telecommunications Union (ITU), United Nations Center for Trade Facilitation and Electronic Business (UN/CEFACT), National Electrical Manufacturers Association (NEMA), IPC–Association Connecting Electronics Industries, ASTM International (originally American Society for Testing and Materials–ASTM), American Society of Mechanical Engineers (ASME), IEEE, American Physical Society (APS), World Wide Web Consortium (W3C), Organization for the Advancement of Structured Information Standards (OASIS), Object Management Group (OMG), and many other professional, industry, government, and standards' organizations. Figure 11.3 illustrates NIST's participation in various standards' development organizations.

11.2 NATURE OF NIST PROJECTS AND PROGRAMS

Within the NIST Laboratories, most projects are scientific and technical in nature, encompassing a broad range of disciplines and interests, as previously described. The technical staff is highly skilled and knowledgeable in their disciplines. Many have advanced degrees and specialized skills necessary for conducting the challenging scientific and technical work at NIST.

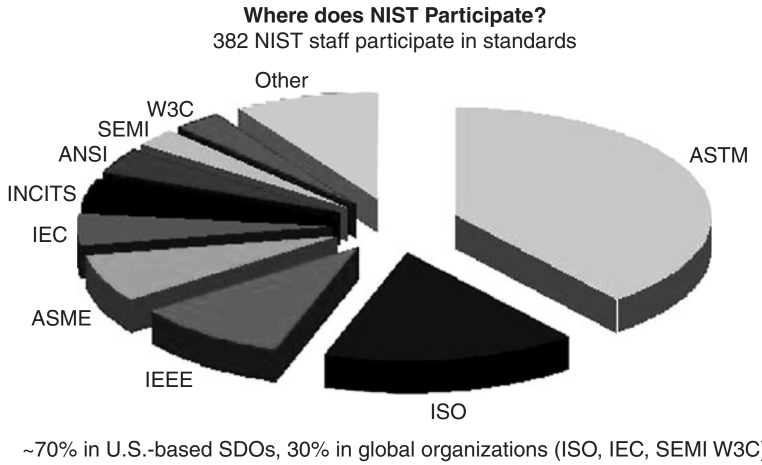

FIGURE 11.3 NIST participation in standards development organizations.

Projects are often done in collaboration with external partners from industry, academia, or other government agencies. Projects are often initiated in response to requirements from industry for new and improved technology, standards, materials, measurement and testing methods, or reference data or materials. Project innovations and discoveries often lead to patents that are shared by technical staff, NIST, and/or external partners. Because NIST is a federal government facility, intellectual property, such as publications and patents, and other products and services, are typically made available in the public domain. "Success" at NIST is measured not by a "profit" margin made or earnings per share, as is done in private industry, but by the scientific and technical merit of the products and services contributed to the nation's economic or social well-being.

NIST technology transfer activities are designed to share NIST research results, products, and services with industry, academia, government agencies, and other customers. The beneficiaries or "customers" of NIST's work are primarily U.S. industry which uses and benefits from NIST research results and services. However, NIST also provides technical support to many standards and government organizations that also benefit from NIST expertise.

Much of NIST work can be classified as applied research, engineering, development, and testing; however, a substantial portion of work involves basic research into new areas where increased knowledge and information are still needed. Examples include quantum physics and computing, biomedicine, technology, engineering, nanotechnology and nanomanufacturing, computing and medical forensics, and homeland security.

Whether NIST projects are basic or applied research, they usually exist within a structured framework for managing projects that is designed to ensure high quality and results. This framework, or structure, begins with a careful review and evaluation of the project's scientific or technical merit, its potential impact and benefit, its degree of risk and uncertainty, and whether NIST can, and should, make a contribution in a proposed area, either independently or in collaboration with other organizations. These criteria are key factors in determining whether a project is approved or not, since NIST resources are finite and best applied where they can make a difference to industry or the nation.

Many NIST projects are focused on some particular aspect of a scientific or technical problem and are usually investigated by a single individual or by a small team of several persons and a team leader. Occasionally, some projects are larger, involving teams of 10 to 20 persons; however, this is an exception to a typical project size. Projects are conducted by NIST technical staff, often in collaboration with industry or academic partners or with professional or standards' organizations. Projects typically span several months to several years and are occasionally longer. Project deliverables may include new technologies, products or services, such as nanotechnology, biotechnology, industry standards, standard reference materials and data, measurement methods, tools and devices, measurement and calibration services, software and conformance testing, and technical publications and journals on research activities and results.

11.3 NIST MANAGEMENT AND PROJECTS

Management at NIST provides vision, leadership, guidance, oversight, and control within the mission and scope of NIST activities. Various levels of management structure exist at NIST:

1. The NIST director, who has overall responsibility for NIST's mission and programs
2. Laboratory directors, who are responsible for the operation and performance of each laboratory that are focused on specific technical disciplines
3. Division chiefs within each laboratory, who have responsibility for major functional components of a laboratory program
4. Group leaders, who are responsible for managing projects under a functional component within each division
5. Project leaders, who manage and/or conduct project research and development efforts, assisted as needed by technical team members

Project leaders and technical staff are organizationally part of a group, within a division, of a NIST laboratory; however, projects may include staff from other groups, divisions, or laboratories as part of a collaborative effort where multiple or specialized technical disciplines are needed to accomplish a project. In fact, such joint efforts among different organizational units are encouraged, since these can provide specialized skills and broader perspective in solving complex problems involving different technologies and disciplines. Similarly, collaboration with industry and universities is also encouraged to ensure that projects are properly focused on needed requirements and that expert knowledge and resources from these organizations can be leveraged for efficiency and success.

Technical projects at NIST usually reflect research or technical needs that have been identified by industry or by the technical or research community internal or external to NIST. Often these needs or requirements are identified from joint, collaborative efforts between NIST and industry or university counterparts, which then lead to collaborative projects between NIST and external organizations in developing solutions for the requirements that were identified.

The technical project is the mechanism by which research needs are addressed and pursued. Projects may be conducted by NIST staff alone or with other external partners, where the roles and responsibilities are distributed among the project participants according to their expertise and capabilities. In working with external teams, NIST has various arrangements and agreements that can protect intellectual property rights (IPR) (for example, patents and inventions) of the team members. This type of IPR arrangements provide a strong incentive for industry or universities to work in collaboration with NIST and provide mutually beneficial arrangements for all parties to leverage each other's expertise and resources and share project results.

However, in a research project, the outcome is not guaranteed or certain. The results from a research project may satisfy the objectives, either completely or partially, or may prove completely inadequate or insufficient and only serve to illuminate a problem. Yet, even in the latter situation, knowledge can be gained by providing guidance and lessons-learned that is valuable for future efforts and for possible future solutions.

Within an organization as large and diverse as NIST, no single approach to managing projects fits all situations. Each project presents its own challenges and requirements that must be met by a project manager and team conducting the work. Project management can vary according to the nature and requirements of the project, and according to the management style of the project manager. Many NIST projects are focused on some narrow aspect of research that may be investigated by a single individual, while other projects are more complex or larger and may involve a support team with multiple scientists and engineers from different laboratories, companies, government agencies, or universities working in collaboration.

In general, a framework of management and technical procedures, guidelines, and practices covering a project's life cycle guides project managers at NIST. This framework is described here according to the major phases of a project's life cycle:

1. Project formulation, planning, and proposal
2. Project initiation and execution
3. Project completion, transition, and/or termination

Each of these phases can be further broken down into additional steps or activities (note that the order and appearance of these steps may vary and are meant as general guidance for project managers):

11.3.1 Project Formulation, Planning, and Proposal

This phase involves the following steps:

1. Identify and define the problem or problems to be solved.
2. Research and review similar or related work and published results.
3. Formulate potential approaches and solutions to the problem(s).
4. Evaluate alternatives, risks, and contingency plans.
5. Select a preferred solution and/or approach.
6. Develop a technical project plan (what, why, impact, cost, and so on).
7. Develop a schedule of tasks, milestones, and deliverables.
8. Identify and estimate needed resources (time, people, skills, equipment, materials, supplies, facilities, and so on).
9. Estimate costs, benefits, impacts, and potential beneficiaries or customers.
10. Identify and obtain potential sponsors and/or funding sources.
11. Prepare and submit a project proposal for review, approval, and funding.
12. Revise and finalize project proposal based on technical and management reviews.
13. Obtain project approval and funding from management and/or sponsors.

11.3.2 Project Initiation and Execution

This phase involves the following steps:

1. Select and organize a project team.
2. Launch project kickoff and orientation (for project team and managers).
3. Develop detailed plans and schedules
4. Develop a work-breakdown structure and interim milestones and deliverables.
5. Assign project work units, tasks, and schedule to technical staff.
6. Obtain needed equipment, materials, supplies, facilities, and other support.
7. Execute work units and tasks. Note that a project may include the following types of activities, which may occur in different sequences, in parallel, or repeat in a circular or spiral fashion:
   - Research
   - Analysis

- Design
- Development
- Testing and integration
- Delivery of interim and/or final products
- Documentation and reporting

8. Meet with project team members to monitor, track, and review the following:
- Status of tasks, activities, and schedule
- Problems, issues, and resolutions
- Plans, project changes or revisions, and new tasks or actions
- Status of funds and expenditures

9. Meet with management or sponsor to monitor, track, and review the following:
- Status of work
- Progress and accomplishments
- Problems/issues/contingencies
- Plans and schedule
- Changes and revisions
- Status of funds and expenditures

11.3.3 Project Completion, Transition, and/or Termination

This phase involves the following steps:

1. Deliver final products and deliverables.

2. Submit final report to management and/or sponsors.

3. Draw conclusions and recommendations.

4. Publish and present project results and work.

5. Gain acceptance and adoption of results and products.

6. Transition and/or terminate project work

11.4 PRACTICAL CONSIDERATIONS AND GUIDANCE FOR EFFECTIVE PROJECT MANAGEMENT

The framework of project activities in the preceding list provides a basic set of steps or guidance for project managers to follow that are applicable to many types of projects. However, merely following these steps does not guarantee that a project will be successful. Other practical considerations can mean the difference between a successful or failed project and an effective or ineffective project manager. Some of these considerations are discussed in the following sections; however, they are neither intended as a complete or exhaustive list, nor do they represent an official NIST "how-to" manual for project managers. Rather, they are offered as guidance based on the author's personal observations of some "best" practices and qualities, noted in successful project managers, and from the author's personal experiences as both a project manager and a team member in many different technical projects, of varying sizes, over many years.

11.4.1 Qualities of Effective Project Managers

Within the NIST research and technical community, the author has observed certain qualities of researchers and project managers who have been highly effective and successful in their work. All of these qualities may not always be present in a project manager; however, successful project managers tend to exhibit many of these qualities, if not most of them, in managing their projects. The list is neither inclusive, nor are the qualities listed from the most to the least significant quality.

Curiosity and Imagination. In many NIST projects, whether conducted by a single researcher and principal investigator or by a manager of a project team, curiosity and imagination often are essential and critical qualities necessary for effective scientific inquiry and pursuit. Often, successful scientists or technical researchers will have a keen curiosity and exceptional imagination that enables them to "think outside of the box" when investigating a problem or its solution. This curiosity and imagination often gives rise to critical insights and inspirations that can provide a vision and path to simple or elegant solutions to a problem. A famous example, of course, was Albert Einstein's fascination and curiosity about the nature of light that he observed as a child in his father's factory and his ability to conduct "thought" experiments, which provided a key stimulus for his later work in relativity theory.

Knowledge and Experience. Whether as an individual researcher or as a manager of a project team, an effective project manager often possesses a broad, if not in-depth, degree of scientific and technical knowledge and experience in his or her field or discipline. Because scientific research is often complex and exacting, formal and specialized knowledge is usually required in a subject area and often in other related disciplines, such as mathematics, statistics, computation, logic, abstract reasoning, and others. Hence, specialized and broad technical knowledge and experience are critical to conducting NIST research projects. This is reflected in the high number of senior, degreed employees working at NIST. At NIST, approximately 65 percent of the technical and scientific employees have advanced degrees, with about 30 percent of these at the doctorate or post-doctorate level.[1]

People and Task Management Skills. In large, cross-disciplinary projects, where different technical specialties may be required, the NIST project manager is unlikely to be proficient in all technical areas. Rather, the project manager must understand the underlying nature of scientific inquiry and the scientific method, which applies across scientific disciplines, and be able to manage and coordinate effectively the tasks and efforts of a multidisciplinary team to ensure that successful results are achieved.

As projects grow in size, complexity, and staffing, a project manager's technical knowledge and skills must be complemented by his or her ability to manage and coordinate multiple tasks and people, often within rigorous time and budget constraints. On large projects involving a large technical staff and many tasks, the project is often broken down into smaller units of work, each comprising some number of logically related tasks and subtasks, with qualified persons assigned to lead and manage each work unit and associated staff.

In this "divide and conquer" approach, the project manager delegates responsibility for accomplishing project activities to work unit managers and staff and reduces the complexity of having to direct and manage the myriad details of each project task alone. Of course, success in this case depends on the abilities of each work unit leader to manage and accomplish their assigned work unit successfully, and on the project manager's ability to manage the overall project work effectively through the designated work unit managers and staff.

In a recent large NIST project,[2] which involved all of the NIST laboratories, the project manager was responsible for directing and coordinating the technical efforts of more than 25 persons, representing many technical disciplines, to complete an investigation of measurement needs across many U.S. industry sectors within a relatively short time frame and within extremely tight budget constraints. This was a challenging project that required interaction with many industry groups and businesses and the coordination of many technical activities assigned to project members. The project was successfully completed on time and within budget, due both to the talents and diligent efforts of the team members and also especially because of the effective technical and management skills of the project manager.

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[1] Source: National Finance Center Personnel Data, as of September 30, 2006.
[2] NIST U.S. Measurement System Project: http://usms.nist.gov/.

Leadership and Integrity. Whether a NIST project is conducted by a single person acting as the principal investigator or as a larger project with a project team, the technical leader or manager is expected to demonstrate leadership and integrity in his or her field and work.

Unlike the myth of scientists and researchers working alone in a "back room" making breakthrough discoveries, most NIST researchers are actively involved with other researchers at NIST, in industry, and academia, frequently exchanging knowledge and information, and collaborating on scientific and technology developments. NIST researchers often "network" with other researchers and actively participate in conferences, workshops, forums, and standards bodies contributing to the technical program of these organizations, and presenting papers on their work. As such, they are often recognized on a national and international level for their technical expertise, leadership, and the quality and integrity of their work.

Decision-Making Ability. Managing projects that are complex or involve many tasks and people inherently involves having to make numerous and frequent decisions about technical issues, tasks, priorities, schedules, assignments, conflicts, and a host of other project issues. Some issues can be relatively simple and the decisions straightforward and easy to make. However, for other issues, the project manager may be faced with having to make a decision among a bewildering array of choices, perhaps with insufficient information on which to base a solid decision, or he or she may be faced with having to choose among unattractive alternatives in which none of the choices are completely satisfactory.

Making such decisions are often difficult and prone to risk, especially where tight time constraints or incomplete information preclude being able to evaluate carefully each alternative and its consequences for the project. Making such decisions are inevitable; however, making the "right" decision or selecting the "best" option under difficult circumstances will often challenge a manager's decision-making abilities, his or her knowledge and experience, and his or her confidence, courage, and integrity.

In one recent NIST project, operating under a tight deadline, the project manager was faced with a difficult decision to drop a significant amount of work done by several of the team members in the final report due to changes in the project reporting requirements. This caused various project members to react with some indignation and frustration, and to question and disagree with this decision, particularly, since the work that was dropped was considered to be of high quality and had involved a significant effort to produce. Further discussions with the project team led the project manager to a second decision that in effect was a compromise that allowed the work to be included as abstracts and brief summaries and acknowledged in the final publication.

In this case, the manager was able to make a decision that satisfied both the project manager and team members. In other cases, a project manger may be faced with making an unpopular decision, which he or she has decided is the "best" decision for the good of the project. In these difficult situations, a manager should base the decision on sound principals or reasons that can withstand the pressures from making an unpopular decision, and the manager should possess the confidence and courage of his or her convictions. Yet, in all cases, a manager always needs to keep an open mind and listen to other team members to ensure decisions are based on all available factors and information.

Many other examples of decision-making that must be made by project managers include how best to accomplish a project, how to estimate adequate budgets and schedules, which projects or tasks to approve and fund, which technical approach to use in a project, which technologies to use, which persons to hire or select for a project, when to modify or terminate a task, and who to promote and who to remove from a project. An effective project manager will demonstrate the ability to make difficult or complex decisions in a timely manner, sometimes under great pressure or constraints, which are needed to guide a project ultimately to a successful completion and results.

Initiative, Enthusiasm, and Persistence. Hallmarks of successful project managers at NIST are the qualities of initiative, enthusiasm, and persistence in performing their work. A researcher will often recognize an opportunity or need for a technical research or development project and take the initiative to develop the idea further until it is ready to be submitted as a proposed project. Behind this initiative is often an enthusiasm and passion to understand and solve difficult scientific and technical problems and to gain understanding of new knowledge.

The overall process of developing, proposing, and gaining management support and funding for a project can be tedious and challenging and requires strong initiative, enthusiasm, and persistence on the part of a researcher to propose and attain support for the project successfully. These qualities are also needed when executing the work, since scientific and technical research and development are usually filled with unknowns and formidable technical and management challenges that require more than technical know-how to be successful. A project manager lacking in these necessary qualities will find it much more difficult to be effective and successful.

Self-Discipline and Focus. Every successful project manager at NIST has exhibited qualities of self-discipline and focus in pursuing his or her work. At NIST, management provides a supportive environment for researchers without undue restrictions and controls. This provides researchers a high level of freedom to engage in their work, without an undue burden of being micromanaged or rigidly supervised, and provides an atmosphere conducive to conducting scientific and technical work.

However, this atmosphere of intellectual freedom requires that NIST scientists and engineers exercise a high degree of self-discipline and focus in performing their work, from project inception to completion. At NIST, project managers are responsible for all phases of a project, from planning and development, to implementation, testing, and reporting, in which they must define the project objectives, schedule, milestones, deliverables, and costs. Their success depends strongly on their ability to maintain a sustained self-discipline and focus on all activities and work throughout the project to achieve the project goals and objectives successfully within the project constraints.

Ability to Leverage Available Resources and Aids. Effective project managers continually seek ways and means to accomplish, simplify, and improve upon their work. This translates into leveraging or using available tools, people, technologies, information, and other resources that can help their projects succeed. Some examples include collaborating with other NIST, industry, or academic researchers; incorporating results, methods, or tools from similar or other scientific and technical disciplines; discovering and leveraging useful information resources on the Internet or from technical libraries (many of which are now available in digital form); using "productivity" enhancing and technical software packages on desktop and laptop computers, such as project management, word processing, database management, presentation, math and statistics, engineering design and analysis, simulation, software development and testing environments, and other software aids; and information and knowledge gained from scientific and technical symposia, workshops, and conferences.

To a large extent, these activities represent some aspect of "information and knowledge management" that involves harvesting of "intellectual capital." That is, the project manager is frequently searching for and acquiring information and knowledge; making decisions based on this information and knowledge; processing, transforming, and applying this information and knowledge; and contributing to and extending the corpus of scientific and technical information and knowledge based on the results of their work. The ability to leverage intellectual capital and other resources from other researchers and published works is a major factor contributing toward successful NIST projects and project management.

Effective Communicator. Successful project leadership and management typically require effective communication skills, both orally and in writing. In all phases of a project life cycle, a project manager is faced with clearly communicating and gaining acceptance of his or her ideas and work to others, including management, coworkers, team members, and peers in the scientific and technical community.

For example, before a project can begin, the project manager is faced with clearly articulating a description of the problem and technical approach, first to him or herself, then to management, and perhaps to colleagues, to provide a compelling argument for gaining approval and support for the proposed work. Once a project commences, the manager is faced with on-going communications to describe activities, results, problems, status, and plans to managers, team members, and peers to ensure they are informed of and understand the work, and to obtain the critical feedback and critique needed for the work.

On large or critical projects, the project manager is expected even more so to be an effective communicator of the work, both to keep management informed, and to provide assurance that resources are being efficiently managed and that satisfactory progress is being made toward a successful outcome and result.

Within a project team, the project manager must skillfully advocate or defend his or her reasons for a technical approach or decision against competing technical viewpoints and arguments from other team members, while at the same time keeping an open mind and evaluating the merit of alternative views.

When a project reaches completion, a project manager will often need to present project results in published papers that are peer-reviewed, where clarity and technical merit are both significant in gaining approval and acceptance by the external scientific and technical communities. When accepted, submitted papers are usually accompanied by oral presentations of the project's work at symposiums or workshops, involving colleagues in the scientific and technical community, requiring once again that project managers be effective communicators.

Quality Work. Effective project managers at NIST are noted for their quality of work and results. At NIST, this can be attributed to both the high level of scientific and technical expertise and competence, and to the NIST culture and environment that encourages and promotes excellence in its employees.

At NIST, numerous programs provide recognition and awards for high-quality and significant work accomplishments, among these being the prestigious Bronze, Silver, and Gold Medal awards given annually at a formal ceremony for sustained and distinguished work achievements. Many NIST awards also include monetary compensations as appreciation for work achievements. Under NIST's "Pay-for-Performance" program, researchers and employees are compensated based on the merits of their work performance, which also provides an incentive for quality work and accomplishments.

However, awards and compensation alone do not produce quality work. Rather, it is an organization of competent and dedicated technical staff, project managers, and management that provide an organizational culture and stimulus to do, and be, the best in their work. For project managers, this environment and culture provides a model for excellence that stimulates and energizes both managers and staff alike and promotes their high-quality products and results.

11.4.2 Strong Project Support Team

Behind many successful and effective NIST projects and managers is a competent and cooperative technical support team that helps make a project a success. To increase the likelihood of success in a project, a project manager will utilize specialized skills and knowledge from many disciplines to complement his or her own knowledge in solving problems outside areas of expertise. In large projects with many tasks and activities or with short timeframes, a strong support team is often essential to balancing the workload and performing the work on schedule.

Within NIST, the support team may comprise NIST staff, consultants or experts from industry or universities, or even experts from other colleagues in the global scientific and technical community willing to collaborate and support areas of common interest. In fact, NIST currently employs more than 730 foreign guest researchers from many different countries. The team members not only provide for specialized expertise but also provide a synergistic effect in working together that can enhance the overall productivity and results of a project. Together, the project team members provide a source of expertise, guidance, and alternative viewpoints on technical activities and a means of providing "checks and balances" in reviewing each other's work.

However, a project team can also present challenges to a project manager in gaining their trust, loyalty, respect, cooperation, and dedication to the project and the manager that are needed to achieve success. Perhaps most challenging is ensuring teamwork and cooperation among project members. Strong teams often have competent persons with strong personalities that can clash during meetings and technical discussion as different viewpoints vie to be heard and accepted. Discussion and intellectual competition among team members can be beneficial and should be encouraged, provided that the project manger can control and guide these discussions to be held in a professional and civil manner, without undue dissension and strife. As in other endeavors, fostering camaraderie and *esprit de corps* can provide the "glue" among team members that achieves a cohesive and "winning" team and project.

11.4.3 Supportive Environment and Culture

The supportive environment and culture at NIST are important and critical factors enabling successful and effective research and project management at NIST. The NIST grounds and facilities are similar to a university campus with spacious areas; modern buildings, offices, and laboratories; and excellent equipment that support the technical staff and work programs. This supportive environment is complemented by a culture of quality and excellence that is promoted by NIST management and staff and is reinforced through appropriate compensation, awards, and recognitions for meritorious and excellent work.

However, compensation, awards, and recognitions alone do not provide a sufficient incentive for excellence; rather, it is the NIST management and staff working together to create a culture of excellence throughout the organization. A simple review of NIST publications, resources, standards, and accomplishments quickly reveals the quality of results and the impact that this culture of excellence has on the work at NIST. Together, the people, the environment, the culture, and work all combine to provide a stimulating atmosphere for technical excellence and intellectual freedom. In the realm of science and technology, such a supportive environment and culture promotes creativity, innovation, discovery, and progress; in fact, it is essential for these important aspects to emerge.

This significance of intellectual freedom and support in fostering successful research projects was well stated on October 4, 2005, by a NIST employee, Dr. John (Jan) Hall, 2005 Nobel Laureate, and Fellow of NIST and the University of Colorado, Boulder, CO, when he said

> Sometimes the best plan for managing an organization is to get the right people and let them follow where their professional interests take them in areas important to the organization. Then good things happen. The proof of that is the now three Nobel Prizes shared by NIST researchers.[3]

11.5 CHOOSING AND JUSTIFYING A PROJECT

The first challenges facing a program manager are deciding on and justifying the work to be done, and obtaining management approval or "buy-in" for the project. Determining what is to be done can be a major challenge in itself and is a critical first step for a project manager or researcher to consider.

Within NIST, and in the scientific and engineering community in general, there is an over abundance of interesting and challenging ideas and projects to pursue. In fact, there are generally more interesting research and technical topics and challenges than there are resources available to pursue them. Clearly, some process or method is necessary to decide on what is to be done and how to select and prioritize projects across diverse technologies.

Many possible ideas for projects stem from needs and requirements that are unmet in industry and society, in areas such as health, defense, manufacturing, transportation, communications, and information technology. Still, other ideas stem from the pursuit of science and technology as the search for new knowledge and understanding continues. From this broad landscape of possible ideas and areas to pursue, a project manager or researcher must carefully decide which are the most important or urgent areas, and then provide the necessary rationale and justification for proposed work.

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[3] See www.nist.gov/public_affairs/releases/2005_Nobel_Prize_Hall.htm.

The process for justifying and selecting projects typically involves satisfactorily answering and evaluating the following kinds of questions:[4]

- What are the problems or issues?
- What parts of a problem should be investigated?
- Why is the selected work needed or important?
- Who will benefit from the results and how?
- What will be the significance or impact of this work? Scientific? Economic? Societal?
- How will this work be done?
- What are proposed solutions or technical approaches?
- What are the risks and unknowns?
- What risk-mitigation strategies or steps are needed?
- What is the likelihood of success? Of failure?
- What are the resources (time, people, money, and so on) needed to accomplish this work?
- Will sufficient resources be available for this work when needed?
- Who should do the work? What are their roles and responsibilities?
- Am I qualified to conduct/lead this work?
- Is my organization qualified and able to perform this work?
- Should NIST conduct this work, and can NIST make a difference?
- Who else is doing similar work? Can this be leveraged?
- Are other qualified people and/or organizations needed, and what are their roles and responsibilities?
- How will results be delivered and accepted?

Answering these questions is a nontrivial effort that is essential to justifying a project and gaining management approval. It requires a project manager satisfactorily to answer important technical, management, and economic issues associated with a proposed project. Even after a project is approved and work proceeds, many, if not most, of these questions will need to be satisfactorily answered once again as problems and issues arise, to ensure that the project focus and effort are properly on target and that the work can still be justified. Being able to answer these questions satisfactorily is an important part of being an effective and successful project manager at NIST.

11.6 KEY INGREDIENTS AND PRACTICES FOR SUCCESSFUL PROJECTS

Significant to the success of a project are various ingredients and management practices. Following are some of the elements, observed by the author, that were significant and effective in achieving and managing successful projects at NIST:

11.6.1 Selecting a Qualified Project Manager

The foremost consideration is selecting a qualified project manager to conduct or lead the proposed project. At NIST, various organizational managers usually select a prospective project manager

[4] Many of these questions are based on a classic set of questions first proposed by Dr. George H. Heilmeier, former CEO and president of Bell Communications Research, Inc. (Belcore, now Telcordia Technologies) and former Director of the Defense Advanced Research Project Agency (DARPA), which are used to evaluate projects at NIST. For further information on Dr. Heilmeier, see "IEEE Spectrum" June 1994, http://ieeexplore.ieee.org/iel3/6/7047/00284787.pdf?arnumber=284787.

from among potential candidates. Candidates may include the person or persons who proposed a project or other candidates and applicants for the position. Selection usually entails a careful review and consideration of all candidates' qualifications and credentials and is aimed at selecting the most qualified person for the position.

Correspondingly, a candidate for a project manager position should understand the requirements and demands of a proposed project and carefully consider whether he or she possesses the necessary experience, knowledge, and skills to undertake and complete a project or task successfully. This requires the candidate to make an honest self-inventory and assessment of his or her technical and management qualifications against the demands and requirements of the project, to be assured that he or she is qualified to undertake the work.

For example, at NIST, it's important for project management candidates to examine whether their scientific and technical abilities are appropriate and sufficient for the research and technical requirements of a project: that is, do they have the requisite technical knowledge and skills in the required technical fields, such as, mathematics, physics, biology, chemistry, or other disciplines that will be important to a project? If the project requires managing a team of technical specialists from different disciplines, does a candidate have sufficient knowledge and experience in these disciplines and in managing project teams? If not, and the project does not allow for learning or acquiring these capabilities on the job, then a candidate for project manager should seriously consider eliminating him or herself from further consideration rather than jeopardize the project due to lack of qualifications or experience, or risk finding him or herself being removed and replaced by a more qualified person later in the project, should the project flounder due to lack of necessary skills and experience.

11.6.2 Selecting a Qualified Project Team

A qualified technical team is essential to a project that is large and/or complex and that can involve many tasks and different technical disciplines. Selecting qualified persons for the team often becomes one of the first critical tasks for a project manager. In selecting team members, a project manager must consider the technical qualifications, experience, and education of the candidates against the project requirements and responsibilities, and attempt to select those most qualified for the project needs.

In some instances, team members may have already been selected and assigned to the project by senior managers, and the project manager must now assess their technical (or management) strengths and weaknesses with respect to project and task requirements, to decide on how to utilize their skills and experience effectively. In this case, the project manager may be faced with team members whose experience, knowledge, or skills are weak or deficient in some respect, and with persons who might not have been selected had the manager been given a choice. This is not an uncommon occurrence and presents a challenge to project managers either to provide necessary training for team members or "make do" with the assigned staff and effectively manage the team and project despite possible limitations. Of course, if serious technical or staff deficiencies could jeopardize a project or cause it to fail, a project manager has an obligation to present these problems to higher management for review and resolution.

11.6.3 Team Players and Cooperation

When a project manager is able to select members for the project team, it is important that team members, in addition to having technical qualifications and skills, also be team "players" and likely to be cooperative in working with a manager and other team members. This is an important ingredient for a smooth and successful project. This does not mean having only "yes" persons who will always agree with a manager or other team members, since this type of person often does not contribute critical, fresh, and independent ideas to the project. It does mean, however, seeking team members who can and will cooperate with the others as part of a "team."

If a person has outstanding technical qualifications but is frequently uncooperative and argumentative, the entire project will suffer. In a project, team members may have occasional disagreements or even arguments, such as when different technical viewpoints or solutions are being proposed or discussed at meetings. This type of exchange over "professional differences" is normal and often encouraged as part of the technical decision-making process. Rather, it's those team members who are chronically uncooperative and argumentative, straining the patience and goodwill of the teammates, that negatively impact the project and morale. In these situations, the project may be better off without them. However, when this isn't possible, perhaps because they provide expert or specialized knowledge needed by the project, the project manager must attempt to eliminate, or control and minimize, these negative behaviors for the good of the team and the project.

11.6.4 Kick-Off Meeting

At NIST, many projects begin with a kick-off meeting or orientation to familiarize the team members with the project goals, objectives, tasks, schedule, deliverables, constraints, and other project information. This meeting provides an opportunity for the team members to get acquainted with each other and with the project manager, to discuss the project, and to allow for questions and answers about the project. It also allows the project manager to get to know the team members, their ideas and concerns, and their personalities, all of which will be important in managing the team. The kick-off meeting is a first step and opportunity in establishing a bond and cohesion among team members and the project manager, which is vital to a successful project.

11.6.5 Manager-Team Relationships

The relationship forged between a project manager and team members is an important ingredient in obtaining trust, dedication and loyalty, and ultimately their best efforts. This process begins at the kick-off meeting, where a project manager begins to establish a rapport with team members and seeks to gain their respect, loyalty, and confidence, and to have them recognize the manager's project leadership role. However, the relationship between a manager and the team, and between team members, is an on-going process that grows and can change over the course of the project. Building and maintaining good relationships is an continual effort based on nurturing, mutual respect, cooperation, trust, honesty, team work, and support among all project members. Good relationships help the project run smoothly and can help overcome difficult situations, and they allow the focus to remain on accomplishing work as a team, and not on resolving disagreements or problems among team members.

A manager's particular management style can also affect his or her relationship with the team, and correspondingly, the team's performance and behavior, either positively or negatively depending on the degree of heavy-handedness and control the manager exerts over people and activities. In research and development environments, such as NIST, a project manager is often expected to demonstrate technical strength, professional leadership, guidance, and management ability, and not micromanage or intimidate others, in managing a project. A less rigid and more relaxed approach tends to enhance manager-team relationships and result in a more motivated, happier, and productive project team.

11.6.6 Assigning Tasks

A key to managing projects and teams successfully comes from knowing the abilities and limitations of team members, assigning tasks commensurate with those abilities, and providing sufficient guidance and motivation to team members to ensure they are able to complete their assignments successfully. In assigning tasks and responsibilities to team members, the project manager needs to articulate clearly, preferably both orally and in writing, the tasks to be done, the allotted time and resources, any interim milestones, meeting schedules, reporting requirements, expected deliverables or products, and any other relevant information or constraints.

When making these assignments, the project manager should allow ample time for discussion and questions on any aspects of the assigned tasks to ensure there are no misunderstandings or concerns as to the responsibilities and expectations of the assignments. Correspondingly, a project manager should be ready to support and assist team members with their work, by ensuring they have the necessary resources and tools to accomplish their work, by providing them clear guidance and direction, and by providing them support and assistance in resolving issues and problems that may arise.

11.6.7 Project Meetings and Communications

Once the project is underway, frequent communications and regular meetings are essential to assessing project status and plans and for managing and guiding a project to a successful completion. Communications can include phone, fax, and e-mails, or shared workspaces on a networked computer system. However, face-to-face communications between the project manager and team members are preferred, and necessary, for effective project management. Such meetings may be with individual team members or with the entire team present at project meetings.

The project meeting provides the manager and the team with essential information for gauging progress, problems, and plans, and for making decisions and revisions based on this information. It also provides the team members an opportunity to present and discuss their assigned work, obtain feedback and guidance from other project members, resolve outstanding issues, and demonstrate satisfactory handling of assignments. And it allows the project manager to communicate to the team relevant information and news and any additions or changes being made to the project.

In preparing for these meetings, a project manager should provide an agenda and schedule of meeting topics to team members, in advance, allowing sufficient time for team members to prepare for the meeting properly. A manager may also solicit topics and suggestions for the meeting from team members beforehand.

A manager should also consider how frequently to hold project meetings, and their duration, to balance the need for monitoring project activities against the possible administrative burden of having meetings too frequently, or for too long, that could interfere with work and frustrate team efforts. A common complaint heard from managers and staff alike is, "I seem to be spending more time in meetings and less in getting 'real' work done." And while project meetings are part of "real" work, they can be excessive and counter-productive to accomplishing other work due to the time and effort they consume.

If possible, the project manager should set the schedule for meetings in advance, preferably to be held on the same weekday, time, and place, so that everyone can plan accordingly and become accustomed to the meeting schedule. Fixing the time and place will also tend to increase attendance and participation at project meetings, since team members will schedule these meetings on their calendars in advance.

During project meetings, the project manager should adhere to the agenda and schedule, and keep the focus on the agenda topics, avoiding extraneous topics and discussions, unless they are critical to the project. In many instances, impromptu topics and discussions can be deferred to a later meeting, rather than allow them to disrupt the current meeting.

A person, other than the project manager, should be assigned to take the minutes of the meeting, recording and summarizing important items, discussions, decisions, and actions taken or to be done. This will allow the manager to focus his or her attention and efforts on running the meeting and not be distracted by having to transcribe all the details and events of the meeting. Attendance or sign-up sheets should be available for attendees to sign their names and to include information, such as contact information (phone, e-mail, and so on). The meeting minutes provide a record and audit trail of significant items or decisions made at the meeting, and the attendance sheet provides a means for identifying and contacting attendees afterward.

The project manager should facilitate discussions during the meeting and allow team members to present their work and contribute to project discussions. Ideally, the project meeting should be for presenting work results and issues and making decisions, and not for spending time doing work that should be done between meetings.

Sometimes team members will engage in lengthy technical discussions or analyses of their work, which wastes valuable meeting time and changes the course of the meeting, interfering with planned topics. In other instances, some team members may tend to dominate discussions or engage in heated discussions that effectively stifle interactions or participation by other team members.

In either case, the project manger is challenged to regain control of the meeting, while attempting not to alienate team members, and bring the focus back to the topics at hand. In particular, the project manager should ensure that no one person dominates the meeting to the exclusion of others whose personality or nature may be less outgoing or assertive. By ensuring that all members participate in the discussions, the project manager obtains all opinions and ideas, and ensures fairness and balance in the deliberations. Often, less vociferous team members can contribute excellent ideas and suggestions, providing they are given the opportunity to speak and are not continually interrupted or overshadowed by others.

As new activities and actions are identified in the meeting and assigned to team members, these should be recorded in the meeting minutes and added to the project plan. As with all task assignments, due dates, deliverables, and expectations should be made clear to the responsible team member when an assignment is made.

11.6.8 Follow-Up, Follow-Up, Follow-Up

Project work includes both planned actions and new task items that are often identified at project meetings. For all tasks and actions, it is critical for the project manager frequently to monitor and track their execution and performance, to ensure that work is being done satisfactorily and on time, so that no major problems or delays are encountered.

In a complex or large project, it is not uncommon for the list of tasks and activities to grow dramatically, straining available resources and managerial skills. This can cause confusion and work overload to team members, which in turn can cause work slippage and changes in task priorities to occur, either intentionally or unintentionally. Even under the best of circumstances, human nature will sometimes cause team members to procrastinate or focus on work that is not important or urgent, or be distracted by personal or financial problems, or simply be unmotivated or lazy and not perform work that is needed. At other times, team members may be absent due to sick leave or family problems. The result is that any of these situations can result in work falling behind, not getting done, or not being done on time.

To prevent such problems or to reduce the risks, project managers should regularly monitor and follow-up on all project work, especially when there are tight deadlines or critical deliverable are due that affect other tasks or the entire project. This cannot be overemphasized. Many projects have gone awry because project managers assumed all was well and allowed too much time to pass without following up and checking on how team members were doing in their assigned tasks and activities. Sadly, many managers find, too late, that the work is far behind schedule or even undone, resulting in project crises. The moral is to follow-up and follow-up frequently, to avoid such work slippage and crises.

11.6.9 Motivating and Building Team Spirit

The saying “all work and no play” has implications for team spirit and cohesion in a project. In projects where the motivation and the team *esprit-de-corps* are high, the cooperation, productivity, and results are often exceptional, as well. Some of the ways that motivation and team spirit have been fostered in NIST projects, are listed here:

- Conveying and reinforcing the merit, importance, and significance of the project to the team.
- Ensuring team members are treated with respect and ensuring members show respect to each other.
- Recognizing and sharing individual and team accomplishments.
- Ensuring that team members recognize and acknowledge the contributions and diversity of other members of the team.
- Praising work and accomplishments well done.
- Conveying confidence in the abilities of the team.
- Fostering cooperation and a “one-for-all, and all-for-one” winning attitude.

- Fostering a positive and optimistic outlook.
- Promoting regular communications among team members through joint efforts, meetings, and e-mails.
- Having luncheons, parties, or picnics to celebrate significant project accomplishments or milestones.
- Making meetings less formal and more relaxed; allowing some time (limited) for team conversations.
- Providing tokens of appreciation, such as certificates of accomplishment, awards, and small gifts to team members for their performance.
- Providing awards and/or compensation for outstanding performance.
- Avoiding criticizing a team member in front of other team members.
- Preventing and stopping team members from unprofessional behavior and personal attacks against each other.

Each of these practices aids in promoting team spirit and is a key part of the project manager's role in the "team-building" process that is important for a successful project.

Recognizing Performance and Accomplishments. Whether at the completion of a project or during a project, it is always appropriate to recognize and acknowledge exceptional or sustained performance of team members who made a major contribution to the project's success. This can be done for individuals, the entire team, or both. Recognitions can be made through formal or informal events attended by the project team and their colleagues, where certificates or plaques are presented noting accomplishments, and where monetary or other token gifts can be awarded. In this way, project managers, or higher level managers, can show their appreciation for project accomplishments and work well done, which in turn builds employee morale and pride and provides an added incentive for improving performance, since employees will know that management recognizes and rewards quality work.

11.6.10 Anticipating, Recognizing, and Handling Problems

A project involves managing and coordinating people, activities, time, money, and other resources. Problems can, and usually do, arise in any of these areas, often unexpectedly. Often, when problems do occur, a project manager needs to resolve them quickly and efficiently to prevent further damage and consequences to the project. The task of anticipating, recognizing, and preventing or minimizing problems, and their impact on the project or team, is a significant challenge for a project manager. To meet this challenge requires that a project manager be continuously on the alert for signs that indicate possible problems ahead, and be ready to take appropriate actions to eliminate or reduce the problems.

Ideally, a project manager will attempt to anticipate possible problem areas and prepare plans for resolving them, should they occur. For anticipated problems, the project manager can prepare contingency plans to minimize risks and resolve these problems. Contingency plans provide alternatives for mitigating problems when they do occur. However, with severe problems that affect or stop further progress and cannot be resolved through remedial actions, the project manager may need to decide whether the project can continue despite the difficulty, be suspended until a resolution can be found, or discontinued.

For less serious problems, a project manager should attempt to control and contain the problem before it gets out of hand. For example, if a team member is dominating discussions at a meeting, interfering by discussing irrelevant matters, or carrying on side conversations, the project manager can try to regain control in several ways, such as getting the team's attention and bringing the meeting focus back on topic, calling on other persons for their input or ideas on a topic, or even cutting off the offending person's discussions by letting him or her know that off topic conversations interfere with the meeting. In simple situations like this, the project manager's ingenuity and leadership skills are challenged to find expedient and simple solutions and regain control in effectively managing the meeting, team, or project.

Other types of problems can be anticipated, which may also have relatively simple remedies. For example, problems can result from poor planning and estimating in developing a project proposal and plan. Sometimes a plan will be too ambitious, attempting to accomplish too much work, in too little time, or with too few resources, resulting in a project floundering or failing over time. Planning and estimating problems can often be detected and prevented with a sufficient review of project plans by management and/or peers before and during the project.

Other problems, such as work slippage, poor staff performance, or excessive expenditures, can be controlled and minimized by careful monitoring and measuring of work activities and costs, against project plans, schedule, and budget. Of course, this requires reporting mechanisms to be in place to provide necessary and sufficient project data and information that allows the project manager to monitor and detect possible problems in these areas.

An example of another type of problem that can be anticipated and prevented is that of not allowing sufficient leadtime to order and obtain needed items. In projects where equipment, materials, supplies, or services are needed, the project manager should allow sufficient leadtime for obtaining, checking and accepting these items. Often this includes time for preparing and processing contracts, evaluating bids or proposals, selecting contractors or suppliers, shipping and receiving, and for inspection, installation, and testing of equipment. In the event of ordered items being unavailable, delayed, or defective upon arrival, the project manager should have contingency plans (such as alternative suppliers) to deal with these situations. In addition, facilities, such as test laboratories, must often be prepared in advance with sufficient space, power, and adequate controls for climate, fire, and facility access before equipment can be installed and operated.

Problems with team members can be the most challenging to deal with. This may include work not getting done; poor work performance; spotty work or meeting attendance; unprofessional behavior; sloppy, incorrect, or inaccurate work results; lack of cooperation or challenges to the manager's authority; insubordination and not following directions; dominating meetings discussion; or being excessively argumentative and belligerent with other team members. Of course, one remedy is to remove or replace the offending person on the project. However, this is usually the least desirable solution and should only be used as a last result after other efforts have failed, especially, if the team member has special skills or qualifications critical to the success of the project. Instead, a preferred approach is to meet with the team member to discuss the problem and have the person agree to change the offensive behavior, so that the problem is either eliminated or reduced to an acceptable level. The manager should also inform the person of possible consequences should the problem continue, and be prepared to monitor the situation and to enforce the consequences that were discussed, should the problem persist.

Depending on the severity of the problem, the manager may want to consider a "backup" plan before or after meeting with the team member, considering possible options and alternatives for replacing the member's services, should that be necessary. If such an event is likely, the project manager should apprise management beforehand of the situation and any planned actions, to ensure management support and agreement and to determine whether management has other conditions or constraints that need to be considered in dealing with the problem situation.

11.7 SUMMARY

This chapter has presented a brief description of the NIST organization and its research and development environment and culture; considered the type of work and activities performed by NIST scientists, researchers, and engineers; and identified some of the methods and techniques used to develop and manage projects at NIST. A framework of steps and activities was described for defining and planning projects, initiating and conducting projects, and completing project work. Further guidance and information was presented for being an effective project manager, including important qualities of effective project managers, the importance of a strong project team and of a supportive management and organization, considerations in defining and justifying projects, and some key ingredients and practices that enhance and support effective project management.

The ideas and suggestions presented herein have been drawn from the author's observations and work experiences at NIST and at other organizations, as both a project manager and a team member on many different projects, ranging in size from small to large, of short and long durations, and which included both simple and complex projects. From these experiences, the author has noted various principles and practices that were evident in successful projects and managers, which have been briefly described herein. The views expressed are solely the author's, and are not an endorsement of any product, company, or technology, and do not necessarily reflect the views or policy of the National Institute of Standards and Technology, or of the federal government.

The topics presented here are neither a comprehensive guide for effective project management, nor are they necessarily an in-depth treatment of each topic, or a "magic" formula that guarantees success in managing every project. They are, however, offered as practical, useful information and guidance, and with the assurance that by incorporating these principles and practices into managing projects, the project manager will be a more effective leader and manager, and better able to mange projects that meet their objectives with successful results.

CHAPTER 12
PROJECT MANAGEMENT SUCCESS AT THE CENTRAL INTELLIGENCE AGENCY

Sean E. O'Hara

Sean O'Hara, PMP, is the director of the Tailored Services Program and Outreach Programs for the CIA's Center for Technology Management, which falls under the Directorate of Science & Technology (DS&T). He joined the DS&T from the Directorate of Support, where he was the program manager for a large and critical technology initiative. Prior to joining the Agency in 2003, Sean was active in the Project Management Institute (PMI), serving as the president of the PMI Pittsburgh Chapter for four years, graduating from the inaugural PMI Leadership Institute, and serving on the PMI IT Member Advisory Group. He received his Project Management Professional (PMP) certification in 2000 and a Master's Certificate in Project Management from George Washington University in 2004. Sean's background includes managing projects and programs in the following industries: manufacturing, financial institutions, public relations, healthcare, chemical, pharmaceuticals, and hospital systems. In addition, he has implemented project management offices and project management solutions, methodologies, and training. A highlight of his career was receiving *CIO Magazine*'s "Top 50" Award for a feature-rich intranet, which helped win *PR Week*'s "Agency of the Year" Award for the PR firm. Highlights of Sean's projects include upgrading 20,000+ workstations, with an overall cost approaching $100 million, and managing a diversely located project team of 50 members. He has been very active as a hiring advisor for the CIA and serves on the DS's Project Management Occupational Evaluation Panel. His focus with DS&T CTM is improving the knowledge and capabilities of Agency PMs through the Tailored Services Program, which will provide services geared toward the transfer the practices learned in the classroom to the workplace, and the Outreach Program, which includes a series of initiatives focused on growing CIA's relationships with external organizations such as PMI, INCOSE, other government agencies, and project management experts across both the public and private sectors. Sean enjoys a wonderful family life in Virginia with his wife of 10 years, Andrea, and three young children, Cullen, Ian, and Lindsey.

12.1 A QUICK OVERVIEW OF THE CENTRAL INTELLIGENCE AGENCY

The Central Intelligence Agency (www.cia.gov) was created by the National Security Act of 1947, signed by President Truman, as the lead intelligence organization for matters outside the boundaries of the United States. The CIA seal is shown in Figure 12.1. The CIA collects information through human sources and by other appropriate methods and holds overall responsibility for the analysis, correlation, and evaluation of all intelligence relative to national security. This intelligence is then

FIGURE 12.1 The CIA seal at headquarters.

combined and disseminated to a well-defined and controlled set of recipients. Ultimately, the intelligence is one part of the overall information that together is utilized by the director of national intelligence and the president to make policy, and by our military to assist in effectively completing their missions.

As a background, the CIA is made up of four directorates, each with its own responsibilities:

- The National Clandestine Service (formerly the Directorate of Operations) gathers the intelligence and conducts covert actions when instructed by the president.
- The Directorate of Science & Technology utilizes innovative, scientific, engineering, and technical solutions to fulfill the national data collection needs.
- The Directorate of Intelligence analyzes and combines the various forms of information, produces from it the intelligence that is documented in the president's daily brief and the senior executive intelligence brief, as well as other classified and unclassified publications.
- The Directorate of Support provides the other directorates with everything they need to complete their respective objectives, such as information technology solutions, logistics, finances, human resources, and so on.

12.1.1 The Main Difference Between the CIA and the Private Sector

Vision and mission statements are commonly communicated in the commercial world when a significant change occurs, such as a new CEO being brought in or purchase of a company. One significant difference between the CIA and private sector companies is the focus—and actual importance of—the mission statement.

FIGURE 12.2 The CIA Memorial Wall (www.cia.gov).

While commercial companies are focused on sales, profits, growth, and especially shareholder value, the CIA focuses on protecting American lives and lifestyles. Eighty-three stars on the Memorial Wall at CIA Headquarters[1] (shown in Figure 12.2) represent each CIA employee who has given his or her life to protect the American way of life and American values.

12.1.2 Project Management at the CIA

One of the first noteworthy observations once inside the CIA is the magnitude of the *triple constraints*—the cost, scope, and schedule—of the projects. CIA projects are significantly larger and much more complex in scope than even the largest projects in the private sector, and the schedules are extremely compressed. In many CIA projects, lives are in the balance, and the extremely high level of dedication of CIA employees is prevalent and deeply ingrained.

In addition, the level of project management maturity in the Directorate of Support (DS) is noteworthy. The standard acceptance of the CIA Project Management Processes (CPMP)[2] methodology affects not only how projects are run but also how the overall DS organizations function. To touch on a point that will be detailed later, the overall understanding, support, and utilization of CPMP throughout the various levels up to and including the Office Directors is exceptional.

Regularly recurring status meetings—called Project Review Boards (PRBs)—occur at each level of the organization. These PRBs are the formal structure through which each project must be navigated via status update briefings. The meetings also demonstrate the acceptance of project management within the DS, which is critical to ensuring that every project is managed with some project management rigor.

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[1] Source: CIA Web site, www.cia.gov

[2] CPMP is one of three distinct project management methodologies present at the CIA. One of the others relates to facilities projects, while the last is a less-utilized methodology for technology projects. Recently, CPMP was replaced by the Project Management Framework (PMF), which is a minimalist-methodology approach, versus the relatively heavy CPMP.

Once a project is baselined at the initial Project Initiation Review (PIR) Control Gate, any changes to the baselined cost, schedule, or scope require the approval of the PRBs, potentially up to and including the office directors (depending on project size and prioritization).

The last area to be highlighted in the chapter is project management training. Organizations of any type that wish to ensure the successful management of projects need effective and knowledgeable project managers (PMs) to lead them. And regardless of the experience level, nearly all PMs require ongoing training and certification to obtain and maintain the sharpness needed to navigate project challenges successfully.

12.2 PROJECT MANAGEMENT EXPERIENCE AND EXPERTISE

Walk the walk or talk the talk? While it seems you can't walk down the street without tripping over a PM, finding one who really knows how to manage initiatives effectively from beginning to end is a challenge. And because *good* PMs aren't falling out of trees, it behooves organizations to invest in constantly improving the knowledge and wisdom of their PMs through a consistent, metrics-based project management training and certification program—whether this is provided internally or externally.

Organization struggling to manage projects or in search of hiring expert PMs should focus on candidates' experience in the following areas (at a minimum):

- Project experience (size, scope, team size, complexity, variety, budget management, schedule development and management, and so on)
- Project management knowledge
- Business knowledge
- Subject matter expertise
- Number of years *managing* projects
- PM trainings, certifications, and areas demonstrating a focus on continuous learning

12.3 EFFECTIVE STAKEHOLDER MANAGEMENT

This section and the next focus on the soft skills required of Agency PMs and the unquestionable affect that a PM's abilities has on the perceptions, approvals, and ultimately the success of projects. While the PM may be an excellent manager of the competing demands of a project, and effective at team and quality management, the PM must also be able to explain clearly to the stakeholders complicated situations and approaches as the project landscape changes. The goal is to leave the stakeholders comfortable with the PM and project team, as well confident in providing their much-needed support.

Regardless of the industry, any project of value to an organization will inevitably require approvals—initially and throughout the project—of higher level management, customers, subject matter experts, and others. In most cases, the PM takes the lead in obtaining these approvals. Approvals vary significantly as well, with some being simple one-on-one conversations and others requiring formal briefings to hundreds of attendees. While all PMs should be able to brief and receive approvals via one-on-one conversations, usually only the experienced and able PMs are responsible for projects that require large briefings. (More on this later.)

12.3.1 Background on CIA Project Management

I was hired into the CIA's Directorate of Support as a result of my experience and the fact that I had my PMP certification. At that time, the internal Professional Project Manager Certification (PPMC) was just launching and the number of staff PMPs was fairly small. To his credit, the gentleman who hired me thought highly of the PMP certification. The organizational need was to improve how projects were being managed in one of the CIA's divisions. This division was by no means the worst, but as with any organization, improvements would improve the success of its projects.

I was asked to manage a new technical program consisting of four projects that were having trouble getting off the ground. The budget was very large—exponentially larger than I had previously managed. It was also very high profile.

It quickly became apparent that my position in the organizational hierarchy was a number of layers (about six) below the final decision-makers—or key stakeholders. In my job prior to coming to the CIA, I reported to the CIO, who was one level below the corporate board (and fighting to join that elite group). Now, I had to wade through six layers of management and review boards to provide status updates or request changes to the baseline of any of the four projects. Even with a good deal of experience, the thought of this was a bit intimidating.

While it took some time to appreciate, the division had a fairly rigid set of pre-brief protocols that started at my branch chief and ascended up to the final decision makers. It became apparent that these pre-briefings provided the best method to gain approvals of the significant players who would be affected by the projects' deliverables. These individuals represented different areas throughout the Directorate of Support, and their buy-in to the direction of a project was critical to gaining approvals at their specific level and from those above their level. These were the same folks who attended the Control Gates and voted officially to approve, approve with exception, or disapprove the project's progress to date and continued progression. Note that it is essential that all management above you but below the target audience of your presentation be pre-briefed. They obviously want to be informed prior to your briefing above them, but it also provides buy-in and support for you.

At least four weeks prior to the scheduled Control Gate (the date of which was decided when the project schedule was baselined at the PIR), the PM and the lead engineer began working with their respective project team members to generate the slides. Early in the project, most of the content of the briefings were project management related, with some high-level slides on the technical direction and potential solution(s). Once design and development began, however, the bulk of the slides were technical. Regardless of where we were in the project, integration of the project management and technical resources was critical to creating a thorough yet clear briefing that provided sufficient details to those to whom it was presented.

***First Briefing:* The Team.** The first review of the briefing was internal to the project team. Usually only a dozen or so team members were present, as having a review with all 40 or so team members proved inefficient and time consuming. This review included everything from the specific wording, to introducing a new technical design, to standardizing the font.

***Second Briefing:* Branch Chiefs.** While the briefing was in a rough draft state, the PM and lead engineer dry ran the briefing to branch management. This briefing provided the first glimpse into the structure of the presentation and the content that would be provided. The feedback received would then be incorporated into the slides.

***Third Briefing:* Division Chief.** The updated slides were presented to the division chief following the branch management briefing. In most cases, one or more of the branch chiefs were in attendance, providing support and insight if needed.

***Fourth Briefing:* Operations Chief.** It was imperative that Operations was onboard with what was being designed and developed (and ultimately deployed), since they would have to maintain the product once implemented. During some instances—especially early on in the project—one or more branch chiefs would be present during this presentation to provide support and answer difficult questions. As always, the PM and senior engineer were present. One key outcome of this briefing was obtaining the support of Operations, which was critical to obtain approval of the Control Gate.

***Fifth Briefing:* Group Chief.** Thankfully, this briefing was seldom done face-to-face. The group chief had her own PRB, during which status of the overall project was provided via the quad chart. The briefing was highlighted during the group chief's PRB when requested, but the entire presentation was seldom required.

Sixth Briefing: **Control Gate or Component Chief.** The briefing was pretty tight by this point. The slide content had been reviewed and modified many times, the messages to be explained were down pat, and the presenters were pretty used to telling the story. These presentations commonly surpassed 100 slides and took several hours to present. The stakeholders stayed after the presentation for the stakeholder caucus, during which they voted one of three ways: approve, conditionally approve, or disapprove.

While most stakeholder caucuses resulted in either an approve or conditionally approve decision, the fear of obtaining a disapprove decision was significant as the impact on the project would be as significant as the impact on the PM.

A key approach to increase the likelihood of success was developed with an extremely valuable contractor named Frances, who helped develop a schedule for our large enterprise projects to prepare for major Control Gates. This approach was then utilized throughout the division for similarly sized projects. This method has been modified into a T-minus schedule, which is an effective way of viewing the necessary preparation activities:

No.	Activity	T-Minus day*
1	Create documentation	T-30
2	Create slides	T-25
3	Review slides internally	T-20
4	*Update slides / documents*	—
5	Pre-brief project team	T-18
6	*Update slides / documents*	—
7	Pre-brief branch chiefs	T-15
8	*Update slides / documents*	—
9	Pre-brief division chief	T-10
10	*Update slides / documents*	—
11	Pre-brief operation chief & operations resources	T-8
12	*Update slides / documents*	—
13	Pre-brief group chief	T-5
14	*Final updates*	—
15	Final dry-run briefing (team-only)	T-2
16	Deliver Control Gate briefing	T-0

*T-Minus days are business days only (five days per week)

Note that in the T-minus schedule, the initial creation of the slides begins five weeks prior to the Control Gate. This has a significant impact on the availability of the project team to complete the design, development, and implementation tasks that actually get the project closer to completion. It was essential that all of the activities were reflected appropriately in the project schedule, and that all resources were working on the current tasks as well as focused on the upcoming future tasks. Without this common understanding, the activities could easily be summed up as chaos.

Needless to say, there exists a fairly formal approach for “briefing up” in preparation for Control Gates or other project review boards (see next section for details on this). PMs must be knowledgeable of the process and its importance to project success, as well as professionally able to navigate the challenges that will inevitably be experienced during the reviews. Those PMs who master this area are often viewed as the best of the best.

12.4 “BRIEFING UP”: PROJECT REVIEW BOARDS

One of the most important skills necessary to be a successful PM at the CIA is that of briefing—or presenting. This skill not only helps position a PM for a future promotion, but is essential for obtaining the buy-in and approvals needed to keep a project progressing toward deployment and, ultimately, completion.

As mentioned, PRBs represent the avenues for providing status and obtaining approvals should changes to the baselines be forthcoming. The PRBs include representation from the important areas throughout the organization that will be affected by the project deliverables, whether as customers or in supporting the product once it is operational. The PRBs play a significant role in guiding projects during their life cycle, thus influencing them is an essential aspect of successful project management at the Agency.

The PM—and at certain times the senior engineer or other technical resources—regularly brief the PRBs with project status using what is called the *quad chart,* which is like a common stop light chart. The quad chart provides the overall project status (via a stop light), plus a breakdown of the following areas: scope, schedule, risks (including probability, impact and mitigation), issues, and upcoming events. While the format is not important, standardizing how different projects provide their status is an easy way to provide a common method that highlights the areas that are important to a particular organization.

12.4.1 Practice, Practice, Practice

The best approach to mastering the process of briefing to large audiences (say, over 100) is to practice. It will inevitably take time to hone your presentation skills. This is a given. But if the goal is to continue to grow to be a better PM—making better money and managing bigger and more challenging projects—presentation skills are a must. Inability to brief successfully creates a ceiling, while talent in this area is an essential quality necessary to becoming an expert PM.

Having said this, a good percentage of people (including PMs) just don't have adequate presentation skills—and some of these folks likely will never develop them to an acceptable level. For PMs who want to be successful, focusing on improvement in this area is strongly suggested. While it is definitely an uncomfortable situation for most of us, it is a required tool to have in your PM toolkit.

At the Agency, the success of a project often depends on the support that the project has at the middle and upper levels (division, group, and component). Being calm, cool, and collected in front of senior management—and getting the particular message across so as to gain the desired support—requires both good a presentation and strong briefing skills.

Familiarity with the content, including technical knowledge of the project, is necessary to capture and maintain the attention of the audience. The presenter must know what is on the slides—what story each slide is telling—and talk to the bullets. This does not mean reading the bullets, which is probably the worst method one can take. Most audiences have a difficult time listening to a briefing that is read verbatim, which ultimately spells failure for the presenter as the whole idea of briefing is to get your message(s) across. Very little information is being transferred if attendees' interest is not captured and maintained. What it does mean is setting up the slides in an appropriate order so that they tell the story, and organizing the bullets on each slide so they make logical sense.

Creating an agenda at the front of the presentation provides the structure of the presentation, which helps attendees know where you are and what message you are trying to get across. It is a good idea to reference the specific agenda item at the beginning of each section of the briefing. For instance, have a slide labeled "Purpose" just prior to the slide that explains why the presentation is being provided. Then, after discussing the slide that details the purpose, move onto the next title slide (let's say, "Design"). The goal is to keep attendees focused on the content of the briefing, and not make them waste time trying to figure out where they are in the overall briefing.

Dry runs are utilized heavily at the Agency. A dry run is basically a practice running of a briefing provided at a lower level of the organization. For instance, if the presentation is going to be provided at the group level, it would first be provided at the branch level, and then at the division level. Dry runs provide several essential benefits:

- Feedback on the quality, content, and presentation style
- Practice by the presenter(s), which results in increased familiarity with the slides

- Buy-in from upper level management (above the PM, but below the ultimate target audience)
- Identification of questions and comments that are likely to arise during the final presentation

The first dry run is usually preceded by at least one walk-through of the slides with the project team. This is really a feedback session, where the floor is open to comments and suggestions. While these generally take longer than the final presentation, they are essential to getting the presentation to a sufficient quality level prior to the dry runs that await. Keep in mind that what others see and hear by way of project presentations ultimately affects the perception of the overall project. This is potentially the only formal insight they have to the project. So take the time to ensure the briefing is well thought out, well practiced, and appropriately arranged. And practice, practice, practice!

12.5 THE BUDGET CYCLE

As all projects obviously cost money, working knowledge of the Agency's budget cycle is essential to ensuring the money required to complete the project is available. The PM should be well informed about the budget cycle and its impact on current and upcoming initiatives. The more knowledge a PM has of the budget cycle, the more prone he or she is to be positioned to receive funding for specific projects.

The Agency's budget cycle is one year. Many projects must be funded by money from more than one year, which creates a myriad of challenges. Often the actual solution is not known at the time inital time funding is requested and thus the cost is a rough estimate. Various funding sources are used, which is both good and bad—good from the perspective that money may be available in addition to the base funding that is received, but a challenge in that the alternative funding cannot be planned and tracking the spending against it can be complicated.

While the budget cycle can be complicated, knowledge of it is essential for the PM to navigate successfully the funding challenges in managing initiatives. Greater knowledge ultimately leads to improved positioning for receiving potential funding for current as well as future projects. This knowledge also leads to increased confidence by others in the abilities of the PM.

Regardless of your influence on the budget process, become familiar with the budget cycle and use it wisely to affect the funding allocated for your initiatives. And get to know those individuals in your organization who control the money, and let them know how important they are to the success of your project. The support from a superb financial resource that knows the funding system inside and out can benefit the overall project considerably—including its perception from the outside.

12.6 LEADERSHIP AND THE PROJECT MANAGER

Leadership is a popular topic not only in project management but across the business world. Leadership allows the Bill Gates and Donald Trumps of the world to excel beyond imagination. On the other end of the spectrum, lack of leadership can lead to a painfully agonizing death, quick or slow. Myriad books have been written and trainings provided in the area of leadership. Projects and organizations have a difficult time succeeding without strong leadership.

At the beginning of most projects, the project team members are eager to engage with each other and be an integral part of the project team. They are willing to work together and to help with the initial activities. As time passes, project teams naturally come unglued due to personality conflicts, difference of opinions, and utter dislike for other team members. The best way to counter these inevitable issues is through leadership from the PM. As the PM, it is absolutely imperative to display leadership at all times from the beginning of the project through its end.

If this book were entirely dedicated to project leadership, it would just scratch the surface. But every good PM must espouse the following traits all day, every day:

- **Professionalism** Conduct oneself with the utmost character, displaying constant maturity and discipline. This cultivates the same behavior among team members and even management and stakeholders.
- **Sincerity** No one can be all things to all people, and the PM will inevitably fall on opposite sides of the fence from others, but it is important that the PM displays honesty and integrity with all parties. Once lost, this is nearly impossible to get back.
- **Fairness** One of the best ways to garner respect is to treat everyone impartially and equally. Failing in this area usually dooms the success of the project.
- **Knowledge** One must have not only project management and project-specific expertise, but also a technical understanding of the project's product.
- **Focus** Through the innumerable challenges encountered throughout a project, the PM must be able to prioritize the tasks (that is, problems and issues) at hand and concentrate on the top three to five. Utilize the same approach to managing risks, focusing only on the top three to five risks that have medium or high probability and medium or high impact.
- **Customer Service** At its essence, success of the PM depends on his or her customer service skills. Everyone is a customer and should be treated as such. No customer, no need for projects.
- **Self-Motivated Growth** Continue to improve and expand one's knowledge and skills. This should be a never-ending approach of the professional PM and should encompass such areas as project management, business, and technical development.

12.7 COMMUNICATIONS

One of the most important aspects of managing projects is the ability to appropriately communicate with the multitude of individuals and groups that are involved or interested in the project. While success in this area will at least make the minefield easier to navigate, failure can totally obliterate the chance of project success.

The PM must be the single point-of-contact for the project. This means that all communications coming into the project (such as questions of either a programmatic or technical nature) and all communications going out from the project must be funneled through the PM. This can be a tough approach to gain acceptance of in some organizations, where the management or technical sides are prone to answer the call. It is, however, essential that the PM handle all communications to ensure a common message and the correct handling and dissemination of the message, and to ensure that the PM remains aware of all that is happening on the project.

Different communications are sent to different individuals and groups. The key is to determine what information should and should not be provided (not everyone should know everything), and what format is best to convey the message. Some effective communication guidelines are shown in the following table:

Type	Method	Format/structure	Carbon copied
Internal to project	E-mail, meetings	Semi-structured, not overly structured	Senior technical resource
Management	E-mail, meetings	Structured, to the point	Senior technical resource
Upper level management	E-mail	Formal	Management, Senior technical resource
Stakeholders	E-mail	Formal	Management, Senior technical resource

The important point is that communications are essential to managing a project properly. The PM and project team must focus on controlling how and what is communicated. If properly managed, effective communications can greatly influence the perception of the project from outside the project team for the better.

12.8 MANAGING WITH A PROJECT SCHEDULE

Regardless of the industry or the type of project, a project schedule is required so that all involved can accurately surmise where the project is in relation to where it should be. In earned value terms, this is comparing the actuals (where you are and how much money it cost to get there) versus the baselined values (where you are *supposed* to be versus how much it was *supposed* to cost you to get there). While some projects are too small, short, or simple to track in a project schedule, most projects are large enough to require some level of tracking.

Nothing displays incompetence more than a PM who does not have an accurate and updated project schedule. The PM is responsible for leading a project to completion via a certain path and within a certain timeframe. Without a project schedule, it is impossible to have confidence that the project is actually progressing appropriately. One of the PM's primary responsibilities, then, is to ensure an accurate project schedule exists. By accurate, the project schedule should list the tasks that are necessary to complete the project and the status of each task. Weekly team meetings should be held to obtain current progress of incomplete tasks, as well as verify that the tasks detailed in the project schedule are still appropriate (validating the task relationships, assigned primary and secondary resources, and so on).

The project schedule should be developed using a bottom-up approach, meaning the various areas of expertise that make up the project team should be represented in jointly creating the project schedule. The best approach to this is by first creating a Work Breakdown Structure (WBS), then from the WBS creating a network diagram. The network diagram is easily generated by identifying tasks using sticky-notes and placing them on a wall in the order that they will occur. The tasks and relationships identified in the network diagram is then easily imported into a project scheduling software, which results in a more detailed and useable project schedule.

The benefits of a team approach are significant. The team members will feel that the project schedule accurately reflects their collective thoughts—because they had a hand in creating the schedule. In addition, the level of buy-in to the project and to the team will be greater as a result of this activity.

An important note on assigning resources: While a task may have multiple resources assigned—such as implementing hardware at a site—only one resource should be the primary assignee for the task, meaning the one individual who is ultimately responsible for its completion. A nice trick is to list that resource first, so that the resource provider shows up first in the Resources field. Any other resources listed after the primary assignee are secondary assignees.

Another tip is to use resource initials rather than the full names. Using initials saves space, which is a premium for most project schedules. When entering the resource into the scheduling tool, put the person's initials into the Initials field (for Microsoft Project) and display the Resource Initials field rather than the Resources field. This is very useful when teams of resources are assigned to certain tasks.

The project schedule is a *living* timetable of activities that—at one point in time—is believed to make up what needs to be done to complete a project effectively. "Living" is important. A schedule changes regularly as the activities are being worked. It is an important exercise to compare the project schedule toward the end of a project with the first version that was created at the beginning of the project. This will inevitably bring to light some stark differences that should be reviewed. Why did it take three times longer than expected to complete an activity? Why didn't we identify the review process required prior to a Control Gate when we first created the schedule? And here's the most important one: How are we going to use the information gleaned from this analysis in the future when we create project schedules for new projects? Lessons Learned.

Project Schedule Columns

Following are standard columns that should be displayed on all project schedules (left to right):

- WBS Number
- Task Name / Description
- Start Date
- End Date
- Percent Complete
- Predecessors
- Resources
- Notes

12.9 LESSONS LEARNED

Documenting lessons learned should be a common process that is followed on every project within your organization. While doing this is not very difficult, doing it effectively is almost never accomplished. And even if lessons learned are tracked, they are rarely reviewed at the start of new projects to ensure they do not happen again. This is probably the most important information that we can gather from our projects, because so many of the problems and challenges on one project are relative to future projects.

It is common to list a task on the project schedule to document the lessons learned—and this tasks is usually slated to occur during project closeout. The problem with this approach is that the project team is so eager to be done with the project once the deliverables are provided that tracking meaningful lessons learned is next to impossible. An alternative approach to waiting until the end of the project to track lessons learned is to make it part of your regular project status meetings. Force the project team to think about things that occur during the project that could be improved upon and—given another opportunity—would probably not be done the same way again. Additionally, lessons learned should be tracked during each approval gate. This approach may also be utilized to identify risks.

The other important factor toward making the lessons learned useful is having a common repository. This can be as simple as a spreadsheet or document or a bit more structured as a database. The goal is to make it easy to access so that lessons learned are more likely to be reviewed when new projects start up. For big organizations, it may make sense to add some criteria to the tracking of lessons learned to allow for easier sorting and querying in the future (such as project size, project type, relative triple constraint(s), and so on).

It is also essential to record lessons learned in a manner that does not make any individuals or organizations look bad. What transpired should clearly explain what happened, how this impacted the project, and how this event should happen the next time so that the impact is minimized or removed. The idea is to improve upon what has happened, not to chastise those involved. Make the wording void of references—whether actual or imagined—to individuals or teams.

One difficult challenge faced at the Agency was that information is not commonly shared. This is a common challenge due to the nature of the business— we have to be good at keeping secrets. As a result, there is a propensity toward holding onto information. With respect to lessons learned, this affected how much "dirty laundry" one area wanted to document and share with other areas. A solution was to build a database to be used by a specific division and its branches. This approach allows the projects within the division to enter their project-related lessons learned, without allowing other divisions access to view them as a default. It may seem strange that information would be tightly guarded, but the fears of sharing—and airing—potentially dirty laundry makes it a necessary approach. The goal to document and learn from past issues and challenges is then achieved.

When tracking lessons learned, keep the following questions in mind:

1. What happened?
2. What was the impact on the project?
3. What would we have done differently so that this didn't happen? (That is, how are we going to do it next time so that this does not happen again?)

Remember not to state names of those involved!

12.10 PROJECT MANAGEMENT METHODOLOGY

A common methodology should be used to standardize how projects are managed in an organization. This can be helpful for even a small company. The key is to organize the methodology so that certain Control Gates (or Phase Gates) occur at the appropriate time. These Control Gates provide reviews that are required to explain what direction the project is headed, what progress has been made, and to gain approval to continue to press forward.

The Agency uses three project management methodologies. Two of these are for technical projects (one of which is IT-related, and the other is for classified reasons), and the third is for facilities projects. An appropriate methodology is selected and supported for all projects within that area. By support, this means throughout the organization, from the trenches to the upper level management. The methodology should be documented, diagrammed, and disseminated throughout the organization.

In addition, this methodology should be engrained into how the organization functions. For instance, all proposed projects must complete a PIR prior to the spending of the first dime. The methodology must be set up to ensure specific areas (departments, groups, individuals, and so on) are involved in the appropriate approvals for project Control Gates. Which Control Gates are necessary for a project are determined during the PIR.

Following are some examples of a standard Control Gates for a small project:

Project Initiation Review (PIR)	Provides initial approval for the project budget, timeline, scope, and resources
Design Concept Review (DCR)	Provides initial design ideas and justifications for choosing them
Critical Design Review (CDR)	Provides final design and configuration to be implemented
Test Readiness Review (TRR)	Provides details of what will be tested, and how
Operational Readiness Review (ORR)	Provides test results and final configuration, displays readiness for production
Project Closeout Review (PCR)	Provides final review of project, deliverables, lessons learned, scope, budget, and so on

Most every company with a project management approach utilizes a unique methodology, especially in areas of naming conventions and the oversight required. At the most basic level, though, the approaches are actually fairly similar in that approvals are required at certain points in a project to ensure buy-in with what has been obtained to date and what course will be taken once approval is received to move forward. Obtaining these approvals is a primary focus of programmatics teams at the Agency, as progress could not continue to the next phase or segment without it. Regardless of what is in place in an organization, the PM must know the methodology thoroughly and also know what is required to wade successfully through the inevitable challenges that confront projects, and in the end complete the project by fulfilling the stated requirements.

12.11 PROJECT MANAGEMENT TRAINING AND CERTIFICATION

Continuous training should be a primary and constant focus of every PM. Regardless of the experience level or training attended or certifications obtained, continuous training not only keeps a PM up to speed on current developments and standards in the profession, but it also demonstrates an ongoing commitment to be the best of the best. In an era of failed projects, where you could be viewed only in terms of the success of your last project, being seen as stagnant may be the last nail in your coffin. In addition, there is a lot to learn and know relative to current project management practices. As the profession continues to grow at an unbelievable pace, it also continues to change. It is the responsibility of every PM to keep pace with these changes while at the same time remaining focused on constant improvement.

Nowadays, many companies provide internal project management training. A multitude of organizations and institutions provide not only project management training, but also certifications and degrees. PMI is growing in membership, particularly due to the popularity of the Project Management Professional (PMP) certification.

The CIA has an internal project management training and certification program that consists of four competency levels and four corresponding certification levels. Each course is followed by a rigorous test, and passing the test for all courses within a level is required to obtain the certification for that level. In addition, obtaining a certification at Level 2 or higher requires passing each test at that Level 2, as well as holding the Level 1 certification. As a point of reference, the pass rate for the PPMC tests is comparable to that of PMI's Project Management Professional exam.

The following courses are offered in the CIA's Professional Project Management Certification (PPMC)

Level 1

PM101—Introduction to Project Management and Systems Engineering

Level 2

PM201—Project Integration and Scope Management

PM202—Project Time Management

PM203—Project Cost Management

PM204—Project Risk Management

PM205—Project Communications Management

PM206—Project Team Management

Level 3

PM301—Systems Engineering Principles and Strategies

PM302—Requirements Development

PM303—Concepts and Architecture Development

PM304—Integration, Verification and Validation

Level 4

PM401—Complex Project Management

PM402—Strategic Project Management

PM403—Advanced Topics in Project Management

PM404—Leading Complex Projects

PM405—Leadership In A Project Environment

PM421—Managing Integration Projects

PM422—Negotiation Skills For Project Managers

PM423—Recovering Troubled Projects

PM424—Intelligent Disobedience

The option is available for CIA PMs to sit for the tests without attending the particular course offering. This is generally done by those who feel confident enough in their knowledge and abilities, and those who have sat for the course and either not taken or not passed the test. These tests are proctored on regularly scheduled days, at which time tests for one or more courses may be taken. Correctly answering the appropriate number of questions—which varies slightly across the courses and is predetermined depending upon the pass rates of previous exams—constitutes completion of that specific course, regardless of whether the individual attended the course offering. This was a big factor for the acceptance of the PPMC program, because a large number of experienced PMs had already taken the previous project management trainings that were in place before the PPMC program was initiated. A substantial level of effort was required to implement this internal program. The potential impact that the program has had since its inception is significant, as well. As a result, an enormous focus is placed on ensuring that the longevity is as guaranteed as possible.

The level of acceptance of a newly introduced project management training and certification program is an essential consideration when implementing such a momentous change. To improve the likelihood of success, the program must have most or all of the following:

- High-level sponsorship (one or more senior or “C-level” managers)
- Internal support of the body in charge of project management standards across the organization, by human resources, and the body that determines promotions (if one exists)
- Successful pilots with a focus on obtaining feedback from a variety of participants, and an open door policy to receive and incorporate the relative suggested changes
- Rigor built throughout the courses and their offerings, including metrics, standardization, and a strict change control process
- Similarity with the PMBOK Guide, INCOSE standards, and accepted approaches in managing projects
- Recognition as a provider or training and certification, such as a Registered Education Provider (REP) by PMI, by the American Council on Education (ACE), and so on

Internal training and certification may not work in your organization, and that’s OK. Plenty of project management training providers are available, as well as plenty of institutions that will also provide certification (such as the PMI and a plethora of colleges and universities worldwide). Many training providers will even customize their curriculum to fit your organization, which may be the best avenue. The important points are that training is essential to ensure PMs are continuously developing and enhancing their knowledge and skills, and that all the PMs in an organization are dancing to the same (standardized) PM tune.

12.12 PROJECT MANAGEMENT SERVICES

More than just training and certification is needed to ensure projects are managed effectively. The director of the PPMC program, Michael O’Brochta, PMP, long ago realized the need for what is internally termed Tailored Services, which summarizes a number of new offerings designed to continue the growth of a PMs’ knowledge, skills, and abilities. This is referred to internally as “Beyond the Classroom”. Improvements in these areas will ultimately result in better managed and more successful projects. Once the training and certification program reach the point of stabilization, the development of the new Tailored Services was implemented, which includes the following offerings.

12.12.1 Workshops

Two new workshops were created to assist in PMs in delivering successful projects:

- The **Project Kickoff Workshop** helps initiate projects by stepping the PM, project team, stakeholders, and management through properly initiating projects.
- The **Project Assessment & Recovery Workshop** assists troubled projects by evaluating what is not being done that should be being done, as well as what is not done adequately. A recovery plan is then developed and implemented with the involvement of all the parties mentioned above.

12.12.2 Project Simulations

A simulation tool steps project team members through extremely challenging scenarios during the week-long, facilitated session. The most significant benefits that this provides are that problems resulting from poor decisions can be learned, yet they do not have an impact on actual projects.

12.12.3 PMI CIA Community

The CIA teamed with the PMI Washington DC Chapter to form this subchapter, which allows CIA staff and contractor PMs to meet during the workday, hear from project management subject matter experts from across the United States, and earn PDUs at the same time. One of the biggest of numerous benefits to working with the local PMI chapter is the ability to identify speakers who have expertise in specific areas that are most applicable to the CIA.

12.12.4 Project Management Knowledge Exchange Meeting

This monthly meeting provides an open forum for PMs to discuss the challenges, trials, and success of projects across the CIA. This is the first gathering that allows PM-only dialogue between all directorates, including both staff and contractors. The goal is to provide a collegial environment where CIA PMs can learn from one another and at the most summary level become more effective at managing their respective projects.

12.12.5 Outreach

This initiative takes advantage of the relationships that have been grown through involvement in the PMI and is utilized to provide direct benefit to the CIA. Relationships have been built with countless professional PMs, and these relationships help bring experts and expert advice into the Agency, directly benefiting PMs. In addition, regular interactions with project management VIPs in other government organizations provides insight (among other benefits) into how other PMs in other organizations are handling the significant challenges inherent in project management within the federal government. These types of approaches are strongly encouraged, regardless of industry or company size, as they result in wider insight into the trials and tribulations of project management in more than just a specific company. Both a wealth of knowledge and an abundance of expertise are available, and most of the experts are more than happy to share with anyone who asks.

12.13 PARTING WORDS

None of the ideas or approaches presented in this chapter is ground breaking or difficult to implement. The important point is that you have the power to improve not only your skills, but your project's and organization's success. Focus on growing your knowledge and abilities. Put the effort and focus into making your projects succeed. Engage with other PMs within and outside of your company. Search for solutions to common problems that negatively impact your projects.

Lastly, find a mentor or sponsor who shares in your quest and allows you to follow your passions. These approaches will ultimately lead to your success. And that is what it's all about.

12.14 ACKNOWLEDGMENTS

A special thanks to Mr. O'Brochta for appointing me as the Director of Tailored Services & Outreach Program. It is an extremely enjoyable position, and he is one of the best managers for which I have had the joy to work!

CHAPTER 13

STRATEGIES AND RESULTS IN THE DESIGN AND IMPLEMENTATION OF A PROJECT MANAGEMENT PROGRAM FOR A STATE GOVERNMENT

Tim Jaques

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Jonathan Weinstein, PMP, is a principal with Line of Sight, LLC (www.directlineofsight.com). Jon has more than 15 years experience in these consulting areas, working with clients in the public, private, and nonprofit sectors. Most recently, Jon managed a project for an international insurance company to redesign its critical year-end financial reporting activities. Past projects include an effort with Tuft's University to redesign a department charged with raising more than $1 billion over the next few years and assisting the Small Business Administration's Office of Disaster Assistance to redesign its core loan processes. Jon is a Project Management Professional (PMP), certified by the Project Management Institute (PMI). His project management credentials include the development of the New York State Project Management Mentoring Program (PMMP), an intensive six-month training and mentoring program for managers across all state agencies. The New York Office for Technology recently selected Line of Sight to deliver the 2006 PMMP. Jon was also a significant contributor to the statewide project management methodology. He has delivered presentations and training on project management, strategic planning, and business process reengineering to groups of all sizes in the around the United States. He has been a featured speaker at the European Project Management Forum.

13.1 INTRODUCTION

In this chapter, the reader will understand the core elements in a project management system for a state government, including the following:

- **Leadership** The major challenges facing project leaders today
- **Organization and structure** Best practices in project management offices
- **Standards and processes** The importance of a program based on standards and processes
- **Training, mentoring, and certification** Best practices for growing a competent, knowledgeable community of project management practitioners
- **Planning and execution** Getting it done: how the best state governments are making project management work

State governments face entirely different challenges than corporations or not-for-profit organizations when implementing a project management program. State government agencies are connected to each other through a network of legislative programs, technologies, services, and customers. No two state governments are exactly alike. The differences in how state governments operate affect the way that project management is implemented. Factors that affect the project landscape include the legislative environment, state government size, budget process, authority of the individual department, and political setting.

Project management in state government has been historically home grown with different facets of the project management discipline evolving because of need or opportunity. The trend is now toward developing a formal PM methodology. Lacking a systematic approach, the project management discipline will mature in sporadic, disparate ways. For example, one state may have a strong training program but lack a robust methodology or culture. Therefore, a project management program must begin with a sound foundation and build upon that foundation a support structure that enables effective project management to occur.

In the private sector, the leadership component is often represented at the top of the model. In government, however, the power bases are not aligned with titles and functions; rather, they are created from the tides and currents that define the current political environment. The traditional leadership model does not work, because the underlying assumption is that a program exists within the nominal authority of a given leader—often a false assumption in state governments. The model must be upended to accommodate the diffuse, disparate, and often disguised leadership role in a state government. In this way, project management does not sit under the umbrella of its leaders so much as it rests upon the bedrock of leadership. Because many projects often lead to organizational change and adoption of new approaches to work, leadership is required. Leaders need to set direction, articulate the vision, and support the implementation of project management.

In the state environment, civil servants and appointed leaders must collaborate to achieve an effective system of project management. Appointed leaders often bring a specific agenda and have limited windows of opportunity within which to make changes. If appointed leaders fail to achieve the necessary buy-in and cooperation from civil servants, they may find that the program is implemented to its minimum requirements, and not “owned” by the department. Civil servants, on the other hand, provide continuity across administrations, legislative cycles, and priorities. Civil servant leaders can be passive-aggressive, knowing that time is on their side for any given mandate. This double-edged sword created by the appointed leaders and civil servants can become either a strong catalyst for project management or a war of wills. For project management to work in the state government, both appointed leaders and civil servant leadership must work together.

In this framework, shown in Figure 13.1, the organization and structure form the first pillar of project management in the state environment. This pillar includes the role of project management office, reporting relationships to agencies and program areas, as well as ongoing operations. The second pillar involves standards and process—the way in which work gets accomplished. Adopting a standard project management methodology is a best practice; however, in the state government environment where departments cut across multiple disciplines and geographic locations, there are

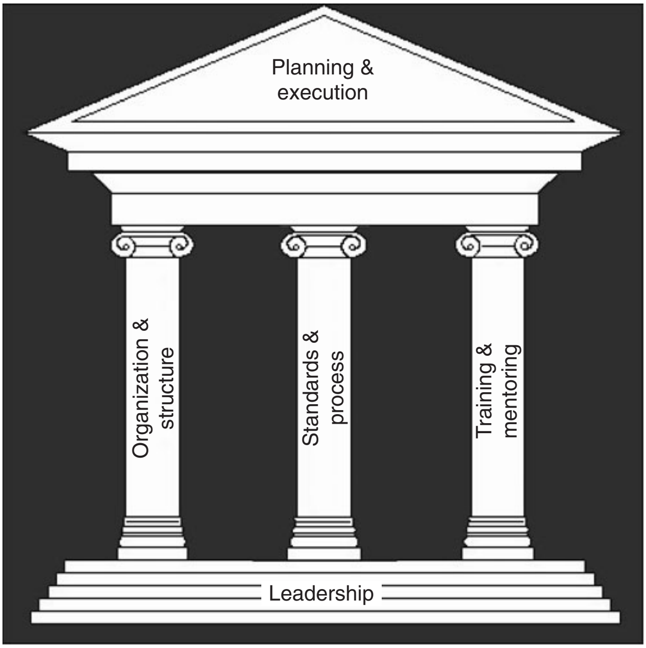

FIGURE 13.1 State government project management framework.

often competing methodologies. Process speaks to the way in which projects engage with the regular, ongoing work of the government, including budgeting and strategic planning. The third pillar of project management in the state government environment is training and mentoring. This pillar involves the development of project management capabilities across the full range of disciplines. These activities, like the other two pillars, support the development and continuous improvement of project management capabilities and competencies in the enterprise.

This framework of project management in the state government environment can effectively enable project planning and execution processes. In a time of increasing accountability of elected and appointed officials and civil servants, outstanding results on important or highly publicized projects are key ingredients to the fuel that drive state governments.

13.2 LEADERSHIP: PROJECT MANAGEMENT SUCCESS STARTS HERE

Leadership is a critical success factor when a state government or its departments seeks to establish project management. Throughout the development of a project management program, leaders are called on to build coalitions and minimize negative influences. Adopting formal project management is driven by the pain of doing projects badly and by the vision to want to do projects better. In either case, leadership is needed because project management represents a fundamental change to the way work gets done in all parts of the organization. So unless the project management program has the requisite leadership, the program will fail to gain acceptance in the management ranks. Project management has achieved a stronger foothold in government organizations due in part to the increasing complexity of projects and fiscal constraints.

Formalized project management in most state governments got a kick-start during and after the challenges of the Y2K effort. One realization from Y2K was that project success depended largely on the quality of the project manager, and especially in government, a dearth of qualified project managers were ready to handle the Y2K effort. Today, new demands drive the need for a formalized, enterprise approach to project management:

- **eGov** Demands by citizens for greater automated and Web-based access to services
- **Cross-jurisdictional integration** Increasing integration of services and information across local, state, and federal agencies
- **Shrinking government workforce** The aging workforce, along with pressures to reduce the number of government employees, particularly in the project-rich technology arena
- **Major modernization projects** Highly technical, complex projects to automate core services such as welfare, revenue and tax, Medicaid, and so on

Trends in these areas contribute to the increasing emphasis on project management in the state government environment. These trends are the source of pressure at all levels in government, from senior appointees to the person answering the phone at the Department of Motor Vehicles.

13.2.1 Where Are the Leaders?

Where does leadership for a project management program in state governments emerge? There is no single answer. Leadership can come from statewide or department executives, middle managers, or program areas. Often, statewide or departmental information technology organizations are a wellspring of project management sponsorship and leadership. Program disciplines such as design, construction, and engineering are also important sources for the project management discipline. The leadership for project management is often individuals who see the value that the discipline brings, contributing to increased project success. From a less altruistic perspective, some organizational leaders come to support the implementation of project management practices because of the growing "popularity" of the subject in the professional circles and the success enjoyed by their peers across their state government. Whether these leaders see the value or simply recognize that project management is not going away, trends suggest that project management is an area getting attention and action.

In 2005, the National Association of Chief Information Officers (NASCIO) issued a report entitled "Discipline Succeeds: Finding from the NASCIO State IT Project Management Survey." In the report, 34 states responded to a survey indicating that they had project management practices at various stages of maturity, and 27 respondents reported having portfolio management practices in place. At the enterprise level, the number of portfolio management programs is rising because of the recognition of the need for an enterprise view of major policy investments and initiatives. At the department level, commissioners are beginning to see that successful project management practices and the establishment of project management offices can yield financial benefits, particularly keeping project spending more in line with their planned budgets.

At the project execution level, state government departments and business units are finding that adhering to sound project management practices yield greater project success, which in turn builds credibility with executives, and ultimately delivers better services sought by the state's citizens. Continued success relies on skilled project personnel, a need that is being met by an increasing number of project management training and certification programs and the establishment of project manager title series among the civil service career paths of many states.

To jump-start a stalled project to create a single point of entry for all welfare services in the state, one project manager sought to enlist the support of key executives with a stake in the outcome. However, part of the problem was that many of the executives were the county welfare directors and were skeptical of the project's benefits to their organizations. Realizing that the support of the localities was critical to the overall project success (a result of a thorough stakeholder analysis), the project manager fast-tracked one element of the project. He decided to expedite the implementation of new data analysis and reporting capabilities for the county directors. With the new capability at

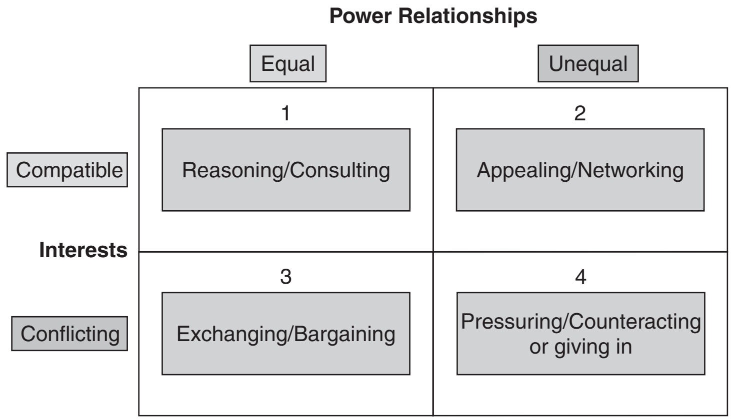

FIGURE 13.2 Stakeholder power-interest matrix[1].

their fingertips, the executives had tangible evidence of the value of the overall project and quickly became strong allies of the project in subsequent battles for resources.

At both the program and project levels, strong leadership is a requirement that does not sit quietly if left unattended. Understanding the power, influence, and importance of the project's relationship with executive stakeholders is key to obtaining and maintaining leadership support. While stakeholder analyses take many forms, the matrix shown in Figure 13.2 guides project managers and team members in the tactic they can employ to manage the relationships with their stakeholders. Each quadrant describes the techniques a project manager should employ depending on the extent of agreement or conflict between the project and each stakeholder (individually or as a group).

Alignment of interests and power allow the project manager to be more consultative or collaborative. However, misalignment requires escalating levels of action on the part of the project manager—more diplomacy at times, or the engagement of other stakeholders that fall in the first quadrant to appeal or apply pressure as needed.

13.2.2 Promoting Project Sponsorship

Executives faced with implementing project management will need to understand the dichotomy that exists between performing project-related tasks and the general adoption of project management. Witnessing the former is not an indicator of the latter. To improve the adoption of project management, leaders should be prepared to promote the concept of project sponsorship to other executives. Familiarity with project management practices tends to diminish the further up the executive chain a stakeholder sits. More often than not, the second and third levels of management are where the battles of project management are fought because of the challenges that project management presents to existing fiefdoms. The effective leader in state governments will use portfolio management to demonstrate the increased visibility into projects as a means of leverage for adoption of project management. At the project portfolio level, leaders are concerned with two areas: "Are we doing the right projects," and "Are we doing our projects right?" The need to answer these key questions drives many organizations to implement project management and portfolio management programs.

[1] Ronald M. Cervero and Arthur L. Wilson. "The Politics of Responsibility: A Theory of Program Planning Practice for Adult Education." *Adult Education Quarterly* 45 (1) (Fall 1994): 261.

The use of formal sponsorship "education" for executives is typically underestimated. If short and sweet is the guiding principle regarding to communication with executives, then use that same principle for educating them. The New York State Office for Technology (NYS OFT) publishes the *Management's Guide to Project Success*, a handbook that provides a high-level introduction to senior management's role in the performance of projects. The guide mirrors *New York State Project Management Guidebook*, the statewide project management methodology. The guide is also presented in a short orientation session geared toward senior managers and executives to help them understand their role in projects and to assist their acceptance of the benefits (and costs) or project management. Armed with the appropriate information and tools, senior management and executives can be more effective sponsors of projects and promoters of project management in their department and across the state government.

The "formal" role of project sponsor provides the leadership, authority, resources, and "top cover" for the project manager. In the state government environment, project sponsors may have achieved their positions in the organization as appointees of the governor. Participation of appointees is a unique factor in managing projects in the state government environment. Where revenue, profit, and cost efficiency are drivers in the private sector, political motivations (i.e., fulfilling campaign promises) and public scrutiny are a source of additional drivers for initiating projects or specific project deliverables or results in public sector organizations. Key deliverables produced early in the project management lifecycle (e.g., business case, project proposal, project charter) can be used to surface political drivers of the project in addition to the proposed business drivers. In some cases, where the lack of sound business needs may kill a project early on, the existence of strong political direction can keep a poor project alive. In these projects, the project manager may have to rely more heavily on leadership participation and strong stakeholder management techniques to achieve results.

At the end of the day, the responsibility for obtaining and maintaining the interest and support of the project sponsor and executive stakeholders falls to the project manager. Establishing clear roles and expectations at the outset of the project and continuously communicating project value and progress will contribute to effective participation by the leaders relevant to the project.

13.2.3 Achieving a Strategic Line of Sight

Leaders provide the vision and strategy for an organization. The governor is elected to enact his or her vision for the state. In turn, the governor selects leaders for the various departments to translate that vision into an agenda for each department's functions. The department leaders create a strategy to implement the agenda necessary to realize the governor's vision. An organization's leaders have the opportunity (and responsibility) to establish or maintain a process to identify, select, and review projects formally within the context of the organization and the enterprise strategy.

The use of a matrix to rate and compare projects is a common practice in the area of portfolio management (more about portfolio management in the "Standards and Processes" section later in this chapter). For each project, the project sponsor, a department's project review and selection committee, or the project manager may complete an assessment of the projects under consideration. The assessment typically scores the projects using objective criteria, in terms of their strategic alignment, organizational impact, risk, and cost benefit. For example, strategic alignment may be rated using criteria such as legislative mandate or alignment to department mission and goals (see the following list). According to a report in October 2005 by the National Association of State Chief Information Officers, 30 percent of the states surveyed responded that their enterprise PMO played a "significant role in guiding business investments, selecting projects and complying with the enterprise architecture."[2]

The following scheme is used to rate and compare the efficacy of each project.

[2] National Associate of State Chief Information Officers. "Discipline Succeeds: Findings from the NASCIO State IT Project Management Assessment," (October 2005): 11.

Strategic Alignment: Legislative or Regulatory Requirement

0 = Not mandated by law

1 = Strongly suggested in law or regulation

2 = Specifically required by law or regulation

Alignment to Mission or Goals

–1 = Not related to mission or documented organizational goals

0 = Loosely maps to mission or documented organizational goals

1 = Explicitly or clearly contributes to mission or documented organizational goals

2 = Explicitly or clearly achieves the mission or documented organizational goals and can be supported with documentation

At the end of this strategic alignment process are the project managers, the front line in achieving the governor's goals. The project manager may seek to validate that the project supports the mission or strategic direction of the organization, even if it is already complete. As the project evolves, key documents such as project proposals, project charters, and business cases provide formal methods for project managers to validate and document the project's alignment with the organization's strategy and the benefits the organization will realize with the successful execution of the project.

Key Points on Leadership

- Leadership is a project management discipline at all levels of an organization.
- Project managers need to understand and manage the leadership in their organization to gain their active participation and support.
- The success of project management as a practice in state governments requires senior leadership sponsorship and promotion.
- The support and success of projects is heavily dependent on their alignment with the sponsoring organization's strategy.

13.3 PROJECT MANAGEMENT ORGANIZATION AND STRUCTURE

While states vary in the way they organize and structure project management, the emerging trend is to establish statewide, centralize project management offices. According to the October 2005 report issued by the National Association of Chief Information Officers (NASCIO), of 34 responding states, 26 have PMOs at some stage of operation. The report also explains that final decisions regarding "priorities for projects (82%), staffing decisions and 'go-live' decisions (79%)" reside with the state chief information officer or a designated governing body."[3]

13.3.1 The Enterprise PMO

In state governments, the term *enterprise PMO* means a PMO that serves the entire statewide organization, or enterprise, with its services. Within state governments, three types of project-oriented organizations exist:

[3] NASCIO report, p. 7–8.

- **Statewide Project Management Office** Serves the entire state with services and personnel. Can act as a controlling function in the management of portfolios and projects.
- **Department Project Management Office** Serves an entire department with shared project services. Can follow a range of models, as with the statewide PMO.
- **Program Management Office** Serves a specific set of projects, or program, with shared services. These organizations can "compete" for resources with the department PMO.

Figure 13.3 illustrates an enterprise PMO that resides within the office of the state chief information officer (or other governing body). A key role of any PMO should include the development, implementation, and maintenance of the project management methodology, standards, and best practices. Further, many PMOs provide or coordinate project management training or certification. In fact, the state of South Carolina has its own project management certification process tied to the project manager title series recently implemented there.

PMOs do not operate in a vacuum. They should work closely with departments having authority over the work of the state government, such as the budget, human resources, and comptroller. Depending on the content of the project portfolio, the PMO may find local municipalities or the federal government among their key stakeholders. The municipalities may serve in a "controlling" role, defining constraints on the impact a project may have on their constituency.

Figure 13.3 depicts the potential relationships of the PMO with its customers. PMOs can support their customers by performing a single role or a combination of the following:

- **Advisory** As a Center of Excellence, the PMO serves as the keepers of the state's project management methodology, standards, and best practices. Their role is to promote sound, consistent project management across the state government. Additional elements of a Center of Excellence model include delivery or coordination of training and certification of the state's project managers.

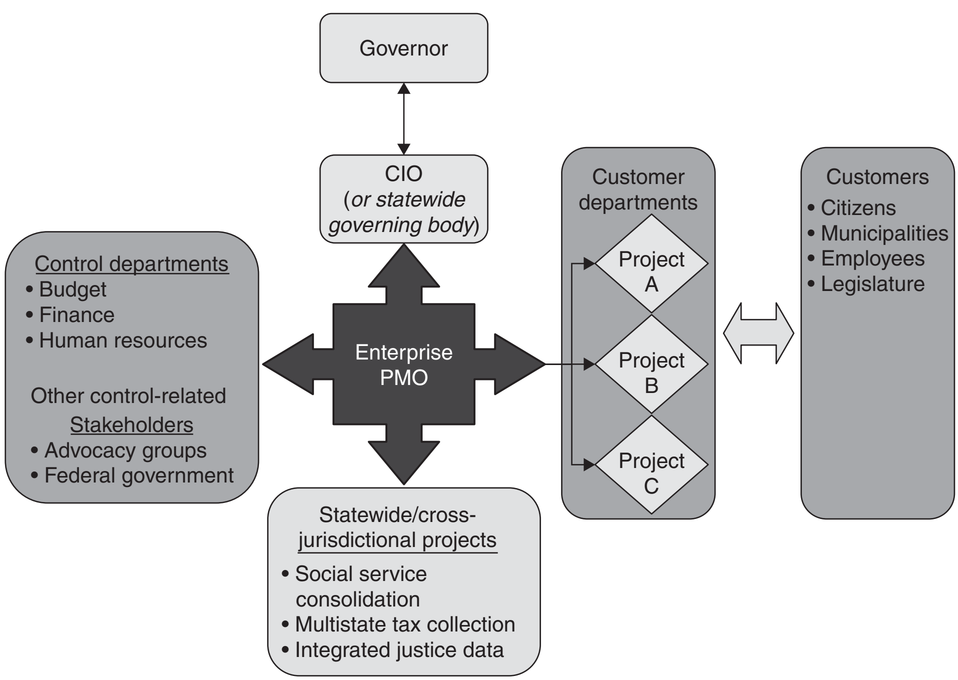

FIGURE 13.3 Enterprise PMO within the offices of the CIO.

- **Project manager resource** The enterprise PMO can maintain a pool of project managers that are assigned to both statewide and department-level projects. In departments where having dedicated project managers is not required or the necessary project management expertise is not available, the enterprise PMO fills an important role, providing the right resources at the right time.
- **Project control** Based on the organization's charter, the enterprise PMO may be the project management control entity for projects that meet certain criteria (e.g., projects of more than $1 million, cross-jurisdictional, or highly complex). In this role, the PMO is responsible for monitoring and possibly auditing development of project management deliverables, status of the overall project, and even quality, when appropriate. As an objective party to the project, the PMO typically is required to report back to the appropriate executive leadership.
- **Portfolio management** The enterprise PMO may be a focal point for administering the portfolio of projects within the scope of the organization. Statewide PMOs often maintain the portfolio of large, cross-departmental projects, while departmental PMOs assist in the local portfolio administration. The PMO can act as a decision-making body, but more often it owns the process of balancing the portfolio against a competing set of resource demands.

13.3.2 Case Study: The New York State Office for Technology PMO

The NYS OFT PMO provides an interesting case study of the genesis of a statewide project management office. As OFT was wrapping up the state's Y2K program, along with some highly publicized project failures, the idea germinated that New York could significantly benefit from the institutionalization of project management practices. In 2000, with executive support, OFT launched a calculated and multipronged approach to meet the project management challenges in New York.

The first step in the plan was the development and implementation of the Project Management Mentoring Program (PMMP). This was chosen as the first step due to the belief that there were "pockets" of project management expertise within the state that could be leveraged to develop younger, new project managers. This group of experts needed to join forces and share their knowledge if the PMO was to succeed. The comprehensive program includes 15 days of formal classroom training with a mentoring component where the PMMP participants are matched with more senior project managers from an agency other than their own. The mentoring component includes five, one-day sessions focused on special topics and one-on-one discussions between mentors and interns. Further, the program fostered hands-on learning, knowledge sharing across agencies, and the establishment of a cohort of state personnel committed to project management. By the time this book is published, more than 100 people will have successfully completed the PMMP.

Once the PMMP was off the ground, the next task was to develop a project management methodology. The need for the methodology became evident as the mentors came together to assist in the development of the curriculum of the PMMP. All contributors to the PMMP were unanimous in their viewpoint that the curriculum should be based on a common methodology. The result of the effort became the *New York State Project Management Guidebook* (now in its second release). This statewide methodology has gained broad use across state agencies, providing practical guidelines and templates for managing projects in the New York state government environment. The success and acceptance of the guidebook has reached beyond the borders of New York, with copies of the methodology registered in more than 27 states and 34 countries (representing every continent except Antarctica). One spin-off of the guidebook was the *Management's Guide to Project Success*. This publication served as a communication and education tool for the PMO and project managers across the state to inform senior managers and department leaders about their roles in the project management life cycle.

While the methodology was under development, the NYS PMO at OFT began to take shape. With the addition of a few state personnel and the assistance of a small consultant team, the development of the PMO was completed. The newly appointed PMO director treated the PMO project as an organizational development effort, working in facilitated sessions with the PMO staff and key stakeholders, including future customers. The focus of the development effort was the definition of the PMO's mission, vision, goals, organizational structure, and the products and services it would provide customers. After a few intensive months, the NYS PMO at OFT was up and running and fielding requests for support by departments across the state. Using consultants and project management vendors to provide the necessary expertise, the approach formally included a process for transferring the consultants' knowledge and expertise to the PMO staff as their numbers, capacity, and capability increased.

The NYS OFT PMO took off quickly but had to weather changes in executive leadership, organizational priorities, and significant budget constraints. However, the NYS OFT continues to support project management with the Office for Technology and across the state. The following factors were key in the PMO's survival and success:

- Commitment to the principles and benefits of project management. The PMO's early success and commitment to services such as the PMMP have contributed to the establishment of more than a dozen project management offices in departments across the state government.
- Continual education of executives in the OFT and in agencies across the government. The NYS PMO at OFT helped to organize and propose the establishment of a new project manager title series in the NYS government, formalizing the career path for project managers in the state.
- High quality products and a flexible methodology made it easier for the customer to use the products and services successfully.
- Results! Many of the participants of the PMMP have gone on to improve project performance in their organizations and are now leading PMOs in several agencies; some have even been promoted into executive positions, including CIO.

13.3.3 Departmental PMO

Implementing a PMO within a single department is quite similar to a statewide PMO. Like the statewide PMO, a department level office can serve as a Center of Excellence, project manager resources pool, or in a project control capacity. The main difference is in the scale and scope of the projects they support.

With the proliferation of PMOs and the increasing institutionalization of project management practices, some PM professionals and PMO leaders are looking for ways to differentiate the way they serve their clients and add value to their organizations. One idea that is being considered by a state agency we interviewed is the implementation of Customer Relationship Management (CRM) principles. At this agency, the PMO director believes she can increase the acceptance of project management practices among the business programs and field offices of her agency if she can provide focused and consistent support by the PMO staff. Since the primary mission of the department is environmental conservation, the content of the organization's projects are highly specialized and would benefit from greater integration of project management and the department's business. Since the resources in the PMO may not have the specific content knowledge of the projects they support, she intends to apply CRM principles such as account management to improve the relationship between the PMO and the business units. Each PMO staff member will be designated as the "account manager" with one or more units to serve as their single point-of-contact for project support. Creating this link will allow the PMO liaisons to become intimately familiar with the business and technology needs of the programs, improve their business analysis skills, and more closely link the IT organization with the business units through better project management.

13.3.4 Managing Project Managers

One state PMO director recently discussed hiring people for their attitude and commitment to project management principles and providing training on the relevant skills and techniques. This philosophy is consistent with Jim Collins's concept of "First Who . . . Then What." His extensive research shows that great organizations tend to focus more about getting the "right people on the bus, the wrong people off the bus, and the right people in the key seats before they figure out where to drive the bus."[4] A key challenge in the government sector is attracting and retaining the right people and removing the wrong people. The "right" people are characterized by self-motivation and self-discipline. Given the difficulty of firing or removing personnel in the public sector, Collins suggests that surrounding the "wrong" people with the "right" people will lead to improvements or self-made decisions to move to another organization.[5]

One way to confirm that the right people are on the bus is to implement an appropriate performance measurement process. Performance measurement is a key feature of sound project management practices. Within the context of the PMO and execution of project management practices, performance should be measured at the individual level, as well as the project level. Both individual and project performance are an indicator of a project manager's success and skill level and could suggest the need for training, mentoring, or even a move off the bus.

Key Points on PMOs

- PMOs are the source of project management structure, standards, and advocacy.
- Forms of PMOs include statewide, department-wide, program, or major project.
- Roles of PMOs include "Center of Excellence" pool of project managers, project control support.

13.4 STANDARDS AND PROCESSES

Projects in state governments operate within a web of regulation, legal mandates, funding and procurement directives, election cycles, and political agendas. These forces collectively play on a project's ability to achieve its objectives. State government project managers must contend with a wide array of stakeholders, like local, county, and federal government entities, which are also saddled with similar requirements. Spanning these requirements is a host of periodic IT, business, and budgeting cycles within which requests for project resources must fall. Project managers and sponsors need to work across these competing demands throughout the planning and execution of a project. Project managers within state government must contend with how to utilize established project management standards and processes and the application to their projects.

Effective project management in the state government environment includes an emphasis on standardized project management processes and effective integration with key organizational planning processes. To be useful, project management methodologies in state government must be broad enough in their approach as to provide sufficient guidance to all of the functions of the state government, including information technology, business process improvement, construction and facilities management, policy development, and program implementation. This wide array of industries and disciplines can cause the methodology to become too high-level, lacking substantive detail. Many states have successfully navigated these waters, producing relevant, useful methodologies that are based on project management and governmental best practices. There are many sources for standards, including the following:

- Project Management Body of Knowledge (PMBOK)
- Project Management Body of Knowledge Government Extension

[4] Jim Collins, "Good to Great and the Social Sectors," Boulder, Colo: J. Collins (2005) p. 34.
[5] Collins, p. 14–15.

- Project Management Institute Practice Standards
- Organizational Project Management Maturity Model (OPM3)
- Capability Maturity Model Integration (CMMI)

13.4.1 Standardized PM Life Cycle

One key challenge facing state governments is the adoption and consistent use of a standardized project management life cycle. The sheer breadth of services and departments creates an environment where multiple, individualized life cycles can be developed and promulgated. Adoption of a single methodology has many benefits, including the following:

- A single source of concepts, terminology, and practices that span all departments for managing projects and stakeholders.
- A common platform for engaging in non-project processes such as budgeting, human resource management, procurement, and general planning
- A predictable set of project management deliverables for the department to use in coordinating internally and with other departments

Competing sets of project management standards can be problematic for departments that must join with other departments in a shared project. For example, many states have adopted legislation to reduce the number of parents who do not pay child support—so-called "deadbeat" parents. The basic legislation involves the revocation of a parent's driver license if he or she fails to pay child support. This is an example of the new breed of legislation that requires close coordination between often-disparate government agencies. Agencies involved in developing a workable solution include the Department of Motor Vehicles, Child and Family Welfare Services, Family Court, and the State Police (Figure 13.4). Undertaking a project of this size and scope requires a common project management framework across the involved departments. Because each of these departments has internal review and approval processes for funding projects, a single coordinating body is often conceived to manage the critical interfaces across the departments.

The project team must develop an ability to work both within the project team environment and within their respective departments. To accomplish this, many project teams adopt a program approach to the management of the effort, whereby each functional department "owns" its portion of the project.

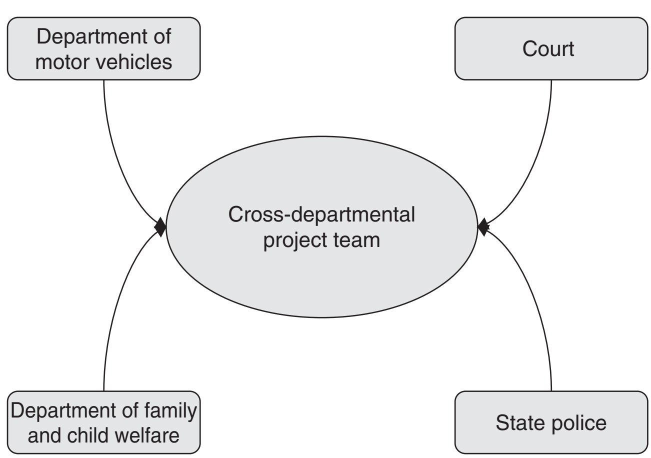

FIGURE 13.4 Cross-departmental project team.

TABLE 13.1 Preliminary Activities that Increase the Changes of Project Success

Actions	Result
Defined project management roles	Creates an environment of accountability in the near term.
Defined project management phases and deliverables	Sets the expectations for the project management environment. Provides the project manager with the necessary agreements to ensure that coordination can occur.
Agreed upon templates and processes	Allows the team to select the most appropriate templates and processes from across the departments.

The program approach, though, can limit the project's ability to succeed, because there may not be a common methodology for managing the project. Each department may employ its own, known ways of developing the project deliverables. In large, multi-department projects, several up-front activities may be useful in organizing the team under one project, as shown in the Table 13.1 above.

States without a centralized project management organization will no doubt find project management life cycles tucked away across different departments. One successful approach to the roll-out of statewide standards lies in recognizing the point at which global standards and local practices can effectively meet. These states have adopted a single, statewide methodology that promotes a series of standards and allows individual departments the flexibility to adapt the standards to suit their local needs. States such as South Carolina and New York have invested in full-scale methodologies that are adaptable and scalable across a number of disciplines. Other states with methodologies include California, Georgia, Michigan, New Jersey, and Colorado. One glance at any two of these states' methodologies will reveal significant differences in the approach and level of detail.

13.4.2 Integrating with Planning and Budgeting Cycles

A project management program is most effective when those processes integrate with existing organizational planning processes. Organizational processes may include strategic planning, annual budgeting cycles, IT governance, and IT planning. The last few years have seen the creation of new processes designed to coordinate and integrate the IT efforts of individual departments across the state. Simply aligning the various planning cycles and their informational needs is a Herculean effort. Yet, coordination must occur between departments, projects, and planning processes. So the question is how can projects most effectively interact with planning and management processes?

One important interface between planning cycles and the project management life cycle is the project business case (Figure 13.5). The business case is an important crossroads between the costs and

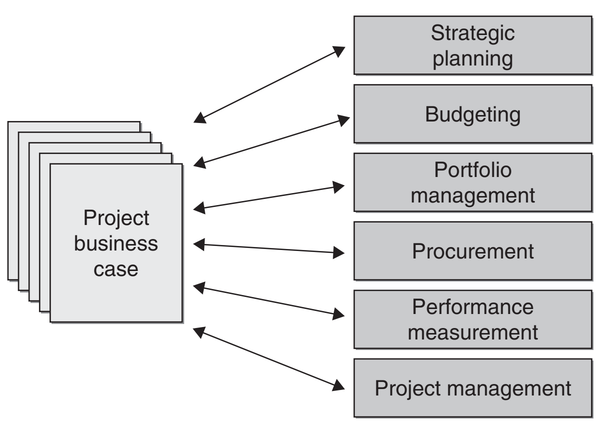

FIGURE 13.5 Project business case.

benefits of a project and the alignment with the organizational objectives. As the figure shows, so much of the project's success depends upon an effective business case. The information contained within a business case supports a wide array of project and non-project processes, as shown. Yet many business cases are treated as high-level summary documents that contain little resemblance to the actual project.

The purpose of the business case is to identify the costs, benefits, and impact of a particular solution. Business cases can range from relatively small efforts to large, multi-month engagements rife with data gathering and business analysis. The best practices of many states suggest that accurate, complete business cases and rigorous review cycles will support many of the processes with information that is required of the project. As the following Table 13.2 illustrates, the business case contents are utilized in a variety of ways, across the range of processes.

Business cases provide a vital link between projects and ongoing planning and operational processes, as shown in the table. Yet with so many departments performing the required business analysis to realize the full costs and benefits of a project, the issues of consistency and quality arise. One way to ensure consistency across the state is to conduct peer reviews. In New York, for example, the Office of the CIO (statewide) has defined a peer review process that assures that business cases involving large-scale purchases are reviewed by a host of departmental CIOs.

One strategy for improving the quality of the business case is to focus the business analysis on two areas: project costs and total cost of ownership. The project costs should describe all costs associated with designing, developing, testing, and rolling out a solution. The total cost of ownership is a life cycle approach to costing a capital asset. In this way, the organization will understand the initial funding strategy, as well as the impact on the overall departmental budget. Accurate project cost data is a frontier that many states are only beginning to come to terms with. For example, many state departments do not track the cost of state employees (i.e., noncontracted human resources). Employee effort is frequently tracked in terms of time, not dollars. However, some state governments have developed tables that show "loaded" rates for the employees at the various grade levels. These rates include the basic hourly rate, as calculated from the grade level salary, and also include a multiplier for the benefits and related costs. In this way, organizations can speak about projects in terms of dollars spent, as well as the time allocated.

TABLE 13.2 Uses for the Business Case are Many and Varied

		Process Interaction					
		Strategic planning	**Budgeting**	**IT planning**	**Portfolio management**	**Performance measurement**	**Procurement**
Business Case Components	**Project objectives and benefits**	Verify alignment with goals			Prioritization	Design performance measures	
	Proposed solution		Perform business analysis	Validate adherence to IT standards			Identify vendor(s) and contract vehicle(s)
	Resources required		Perform business analysis		Conduct enterprise resource planning		Source selection plan
	Project cost data		Budget for resources		Maintain total cost of portfolio		Identify cost of vendor resources and materials
	Cost-benefit analysis	Verify alignment with goals	Validate business analysis		Balance portfolio, manage investments	Maintain accountability, measure ROI	Determine "Build vs. Buy"

Key Points on Standards and Processes

- Leverage existing and proven standards and processes from within departments of the state government or relevant organizations.
- Promote common standards and processes adaptable to departments' particular environment.
- Integrate project management standards and processes with other state government cycles—budgeting and planning cycles.

13.5 TRAINING, MENTORING, AND CERTIFICATION

Training is the glue that holds together the project management processes and standards with the organization and structure. To promote consistency across programs, any training should follow the state's project management methodology. Furthermore, training and education should be delivered at all levels—project team members, project managers, and senior department managers and executives. In addition to enhancing critical skills, training contributes to retaining experience project management personnel.

13.5.1 The New York State Project Management Mentoring Program

Senior managers in New York were finding that sending people to vendor-based project management training was not meeting their needs. The training tended to be oriented toward the private sector and not always applicable to the public sector environment. To fill the gap of a public sector project management training program that suited the needs of New York state, the Office for Technology set out to develop the Project Management Mentoring Program (PMMP). The program was designed to go beyond classroom training by leveraging the assets and expertise found across the state.

New York developed the core curriculum, ensuring consistency with the PMBOK knowledge areas and the processes. The curriculum was supplemented with several case studies developed from actual New York state projects. One critical component of the program was to match the program participant or interns with more experienced colleagues from other departments. A cadre of interns is matched with mentors based on expertise, development needs, and communication and work styles. Interns attend 15 days of classroom training over a six-month period, interspersed with five practicums. Each practicum consists of guest lecturers, highlighting real-life case studies, emerging trends, or opportunities for the interns to practice the new skills and techniques they have learned during the classroom sessions. Mentors and interns also complete 15 hours together in various settings—the mentor observing and coaching the intern at his or her place of work, the intern observing the mentor demonstrating certain skills/techniques in his or her workplace. At the conclusion of the program, the interns receive graduation certificates and transition to the mentor ranks.

A continuous improvement approach is also built into the PMMP, seeking input and recommendations and lessons learned from the participants at each training session and in a Project Closeout workshop at the end of each six-month program. An outcome of the early continuous improvement efforts was the development of the *Management's Guide to Project Success*. Along with the guide, the OFT PMO offers additional training to the state's senior managers and executives. The PMO coordinates their training activities with the governor's Office of Employee Relations (GOER), spurring the development of companion classes offered statewide by GOER. Topics such as "Project Management Essentials" are offered to project team members, while "Advanced Facilitation" is available to project managers seeking to hone skills important to good project management.

13.5.2 To Certify or Not to Certify

Certification in the state training or an industry-standard program promotes the acceptance and institutionalization of project management as a professional discipline and not just an extra duty. Depending on the vision and strategy for project management in the state, a variety of certifications might be relevant to the environment. PMI offers certifications as a Project Management Professional (PMP) or Certified Associate in Project Management (CAPM), as well as Consultant and Evaluator certifications in their Organizational Project Management Maturity Model (OPM3). Some state governments are developing their own, state-specific project management certifications. These certifications generally indicate expertise in project management and in the state's particular processes.

For example, South Carolina's Division of the State Chief Information Officer *requires* that project managers complete the state certification program and that projects cannot move to the procurement or planning phases without a state-certified PM assigned to the project. South Carolina maintains a cadre of certified project managers for major, multi-departmental, or enterprise projects. The following two levels of certification are offered:

- **Senior Project Manager** Experienced project managers who have worked on major projects in the past. To be certified, project managers are required to complete an experiential/classroom component and a six-day boot camp.
- **Associate Project Manager** Project managers on minor projects, or "project coordinator" for larger efforts. Certification includes extensive training and on-the-job mentoring.

Within the state civil service system are four job classifications for project managers as well. These include Project Coordinator, Project Manager 1, Project Manager 2, and PMO Director. South Carolina supports the project management process with training for project sponsors, vendors, and related roles common to a project. In considering how best to implement a statewide project management program, certification should be seen as both an outcome of and a catalyst for a more mature project management environment. A robust certification program, such as South Carolina's, helps to ensure that projects are planned and executed in a consistent manner across the state.

13.5.3 Developing and Delivering Training

The benefits of training and certification are pretty clear for most organizations. However, determining how to develop and implement a program such as the PMMP presents a challenge. Is it better for state governments to focus the effort internally or externally? The answer depends on several factors. The following Table 13.3 describes the plusses and minuses of each development and delivery approach.

TABLE 13.3 Development and Delivery Approaches for Project Management Training Programs

Internal		External	
+	–	+	–
Owned by state	Cost to keep updated	Buy and forget	Reliant on vendor
Customized to fit state's methodology, standards, and policies	Resources available to train (not typically a core competency in state governments)	Vendor responsible for updates to curriculum and material	State misses an opportunity to build internal capability for training
Implement in a single department or across the state at any time	Overhead to administer and manage development, delivery, and certification	State can "shop" for best value	Pay per use of materials and/or training delivery

The best approach is likely a hybrid of the internal and external elements to training development and delivery. An example might be to develop and deliver a training program customized to the state's methodology, but to outsource training on specific tools that are regularly updated, such as Microsoft Project.

13.5.4 Project Management Communities of Practice

One consistent activity that transcends government departments and state borders is the establishment of a project management "Community of Practice." Many states have chartered Project Management User Groups (PMUGs) to provide a forum and network for continuing education, sharing lessons learned, and addressing project management issues faced by the state's project managers. Some states open their PMUG to local governments, educational institutions, and even vendors to expand the breadth and depth of knowledge and experience of the group's participants. Often, subcommittees of the PMUG are used to maintain the state's project management methodology, monitor the efficacy of the state's project management training programs, and serve as an advisory body to the statewide PMO.

Key Points on Training and Mentoring

- Link training and mentoring program with established project management methodologies.
- Build complementary capabilities of project managers, providing training in facilitation, negotiations, and personnel management.
- Promote certification programs, internal or external, to increase capabilities and retain key employees.

13.6 PLANNING AND EXECUTION

As the roof of our so-called project management "building," planning and execution is a seemingly simple topic. Just get it done, right? Not quite. A statewide project management program needs to address planning and execution at both the enterprise and the project level. At the enterprise level, project management standards and processes should be designed to support the planning and execution of individual projects. For example, all projects within the enterprise should strive for a common set of metrics in the areas of cost, schedule, and scope, to name a few. Managing to a defined set of performance measures will drive standard execution of projects.

At the project level, planning and execution are quite the same no matter the environment. Scheduling, risk identification, and kickoff meetings all need to happen. Projects still require status reports and sponsor meetings. Project managers new to the public sector often take solace in the fact that many project management artifacts look just like the "real thing." And even though public sector projects are indeed the real thing, the public servant has a decidedly different path to follow than the popularized project management dogma would have them believe.

For example, many books and articles point toward project profitability and return on investment as indicators of project success. But the public service project manager knows that profitability is meaningless, and ROI, though valid, is still a wild creature yet to be tamed in the public sector. The following Table 13.4 describes some of the key differences between the two sectors in project planning and execution.

13.6.1 Project Planning Considerations

The planning phase is concerned with producing a viable project plan that will address the business and technical objectives of the project. The plan must attend to the needs and wants of many different

TABLE 13.4 Key Differences Between Public and Private Sector Project Management

	Public sector	Private sector
Planning	Staffing driven by civil service and union rules	Able to hire as needs/resources permit
	Mandated budget cycles and spending thresholds	Economically driven funding models
	Business case must address stakeholder needs	Business case must make economic sense
	Onerous procurement guidelines	Varying degrees of procurement bureaucracy
Execution	Resource driven	Economically driven
	Diffuse power base	Nominal power base
	Both Political (capital *P*) and political (small *p*)	political (small *p*)
	Results linked to program outcomes	Results linked to economic performance

constituencies and possess intrinsic logic coupled with realistic assumptions. Many risks should be identified and evaluated during this phase. Cost, quality, and time issues are at the forefront of the discussion, as the key drivers of most projects. In planning, project teams are formed and future human resource needs identified. The flexibility of the human resources function is limited in most state governments. Often, the most viable path to acquiring resources is to hire contractors. The civil service structure is typically legislated to support ongoing processes, not projects.

Another factor to consider is that state governments must operate within rigid budgeting and contracting parameters. Projects are tied to the annual budgeting process, which means that project managers must often consider the project in terms of fiscal year budgeting. These parameters can lead project managers to rely on certain procurement vehicles or contractors due to their availability. Spending thresholds and procurement rules may also limit the project's available options.

Initial planning processes should result in a business case. The business case presents a rationale for moving forward, holding, or canceling a project. The business case, unlike in the private sector, does not live or die based on its economic merits. The success criteria used in projects is often focused on the organization's ability to meet a new mandate or implement a new service offering or expedited process. With the rise of project management practices, many government agencies have begun a more rigorous approach to quantifying the costs and benefits of a project. Often, projects will result in the need for more people to maintain a new system. Yet if the product of the project is a new service or enhanced operation that benefits the taxpayer, then the system is often seen as a success.

13.6.2 Project Execution Considerations

In execution, project managers must deal with projects in complex work environments. Project stakeholders maintain disparate power bases and often send conflicting signals as to the importance and benefits of the project. In the public sector, project managers must emphasize collaboration across the power bases. In the private sector counterparts, collaboration is a critical component as well; however, the power centers are more concentrated and organized within a structural system. Unit managers report to a division manager, who reports to a district manager, who reports to a vice president, and so on. In state government, the power bases are diffuse and include elected officials, tenured civil servants, independent constituencies, and advocates.

Another element that cannot be overlooked is the political environment. In a state government, two levels of political activities exist. The first is commonplace office politics, which occur in every workplace setting. This type of *politics* (lowercase *p*) has to do with personalities, advancing agendas, and getting the desired results. The second level, called *Politics* (uppercase *P*), has to do with working within an environment of elected and appointed officials. This element results in the diffuse power bases discussed earlier.

A variety of confounding issues can work against project managers in execution:

- **The silo environment** Departments operate functionally and often accommodate project management as an afterthought. In state governments today there are few or no fully projectized organizations, excluding PMOs. Government organizations are organized around the programmatic, legislative, and funding sources that drive the department.
- **Focus on requirements, not on customers** Often, though by no means always, projects are organized around a set of requirements, be they legal mandates, organizational changes, or implementation of new technologies. Even when the stated purpose is to help the customer of the department, project leaders will not put the customer squarely in focus. After all, one doesn't often hear of government agencies conducting customer focus groups to determine the best possible solution (although it does happen). For whatever reason, departments that lack the customer focus will have a harder time responding to the customer needs rather than the requirements of the project.
- **Resistance to change** The staid, immovable, bureaucratic government employee conjures up a stereotype that is often misplaced. Most state governments have undertaken monumental changes throughout the 1990s and early 2000s. New technologies, business processes, and the push toward self-service have kept state governments in a near constant state of evolution. Still, many departments are faced with outmoded policies, practices, and technologies. And, as is human nature, many state organizations resist changes until mandates force a change upon them.

Project managers need a way to navigate these waters so that the project progresses and customers receive maximum value at each project phase. Project managers and team members should quickly cut through the morass of stakeholder issues to identify and resolve problems that could jeopardize the project. Consider the following three key strategies for improving execution in the state environment:

- **A common understanding of purpose** Stakeholder alignment is the underlying theme. Project managers are usually concerned with defining deliverables and scope. Our stakeholders want to know how those deliverables will coalesce into their desired business outcomes and benefits. How long before those business benefits are realized and what is the cost? In the absence of a common understanding of the project's purpose, stakeholders will perpetuate their own versions that are often in conflict with each other. Project teams can develop simple messages that describe the purpose of the project and how it links with the big picture. For example "The new web-based driver's license and vehicle registration renewal services will decrease the lines and waiting times at the Department of Motor Vehicles offices, increase customer satisfaction, and increase employee availability to address more complex transactions." Stakeholders identify with business outcomes. Using business terms and linking the project to a known problem or opportunity will help align the stakeholders under a common understanding of the project's purpose. Engaging in straightforward dialog will also support acknowledgment and handling of opposition stakeholders.
- **Executive commitment** Every major project must be sponsored by an executive manager. Commitment is best demonstrated through actions such as securing funding and resources, advocating to other executives, setting priorities, and resolving issues. A project sponsor assigns authority to the project manager to use resources beyond their usual scope of control for the purposes of completing the project. This authority is derived from an executive, so in the absence of demonstrable executive commitment, the project will often fail because there is no legitimate decision-maker driving the project. State government executives sometimes do not know how to display commitment for the project and do not understand their role in the project. The *Management's Guide to Project Success* from New York state is an example of providing the executives with the tools for being effective sponsors. The project manager can help by providing specific behaviors and direction that will demonstrate project commitment.

- **A shared sense of urgency** Project stakeholders should display a sense of urgency about completing the project—not necessarily life-and-death, but urgency denotes the underlying resolve and commitment for completing the project. Not all projects are the top priority, and certainly a five-year effort presents problems on the urgency front. However, the project was originated to solve a business problem and if that problem is real and compelling, it should translate into a sense of urgency from the stakeholders. Although stakeholders will probably vary in their degree of commitment, a critical mass is required to proceed with the project.

Key factors that may influence the planning and execution process include accountability and authority. Accountability is sometimes elusive in the public sector environment. A well structured PMO and clearly established project management environment enables effective accountability. Establishing project and individual performance goals and a project structure that promotes accountability will foster responsiveness among project teams to the executives, the organization, and the stakeholders.

One "incentive" by South Carolina's Division of the State Chief Information Officer relates to that office's level of oversight of IT projects performed in the state. The division of the CIO performs active oversight for projects of more than $1 million. However, that ceiling is raised to $5 million if an organization has implemented a PMO and the state's project management standards. This policy is perceived as an incentive by the departments conducting the projects and serves as strong motivation for them to implement the appropriate standards, training, and certifications. In this case, everyone wins—the department achieves greater flexibility, the CIO's office can focus on organizations and projects that require greater attention, and the state and its taxpayers enjoy a greater opportunity for project success.

Experienced project managers know that projects often result in compromise. For example, deliverables are often sacrificed for lower costs or cost is often sacrificed to meet a completion date. These tradeoffs are the very business of managing projects. Caution is recommended when seemingly typical project tradeoffs reveal a deeper chasm between stakeholders.

The following Table 13.5 describes methods for correcting common problems associated with drivers of successful projects.

TABLE 13.5 Three Drivers of Successful Projects and Methods of Ensuring their Existence

Strategy	Signs and Symptoms of problems	How to invoke
A common understanding of purpose	• The same words have different meanings (e.g., "requirements") • Stakeholders identify disparate outcomes • No defined, documented scope	• Complete or validate a statement of work • Clarify key concepts and words • Validate with stakeholders the project deliverables and long-term outcomes
Executive commitment to the project	• Does not speak "on message" • Does not deliver on commitments • Fails to resolve conflicts • Either ignores the project or micro-manages	• Understand executive motives and try to accommodate • Provide a discrete set of responsibilities for the executive to fulfill • Build and maintain an effective working relationship
A shared sense of urgency	• Lack of focus and energy for the project • Priority of the project is questioned • Stakeholders don't commit resources • No clear champions for the project emerge	• Communicate how the project addresses current business needs • Define the benefits in terms of the problem or opportunity • Set short-term goals

Key Points on Planning and Execution

- Development and use of a thorough business case throughout the planning and execution phases will maintain (or refocus) commitment on the project.
- Beware of issues that confound project managers during execution: organizational silos, customer demands, and resistance to change.

13.7 SUMMARY

Planning and execution, the roof of the house of project management, is the place under which things get done. Plans are made, tasks are assigned and completed, projects are executed. Yet this roof is affected by the pillars and foundation—the extent to which the pillars (organization/structure, standards/process, and training/mentoring) are not aligned with the goals of executing successful projects; and the foundation (leadership) is not supportive of the "projectized" environment, so the roof sags and buckles under the weight of the projects that fail.

State governments have evolved in the past few years to a leadership position in the area of project and program management. The state environment is different from all other project management environments because of the scope and scale of projects and stakeholders. State governments, as the midway point between local and federal governing bodies, have the resources and authority to conduct many large projects each year. Yet the environment is distributed to the point that project management operates at a risk. The best practices are culled by groups such as the NASCIO State IT Project Management Forum. Critical challenges faced by agencies and states include these:

- Growing project managers in a civil service environment
- The project manager as contract manager
- Managing large, cross-agency projects
- Executing against the myriad life cycles influencing projects (project management, procurement, systems development, governance, and others)
- Fostering the growth of project management—communities of practice

13.8 ACKNOWLEDGMENTS

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CHAPTER 14

EVALUATING PROJECT MANAGEMENT EFFECTIVENESS OF BOSTON BIG DIG AND THREE GORGES DAM IN CHINA

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ABSTRACT

Implementing the processes, practices, tools, and techniques of project management are essential to project success, particularly for large projects. The requirements, resources, and complexity of engineering and construction projects are greatly larger than the average projects, and applying project management principles is a must. This chapter discusses project management effectiveness of two mega projects in the engineering and construction industry. Boston Central/Artery Tunnel project and Three Gorges Dam Project in China are selected to analyze the level of application of project management processes. The goal of this chapter is to identify the opportunities and lessons learned for implementing and improving project management practices for large engineering and construction projects.

14.1 BOSTON CENTRAL/ARTERY TUNNEL PROJECT

The scope of the Boston Central/Artery Tunnel Project, the so-called “Big Dig,” was to replace a deteriorated and congested elevated roadway (I-93, the central artery through Boston), extend the Massachusetts Turnpike (I-90) to Logan Airport through a harbor tunnel, provide an interchange of I-90 and I-93, and replace the I-93 bridge over the Charles River.

In the 1970s, city planners estimated that given Boston's estimated growth, stop-and-go traffic jams would exist for 16 of the 24 hours of the day in the downtown area by the year 2010 (Massachusetts-Turnpike-Authority, 2006). Boston and Massachusetts officials decided that the existing elevated highway system in place since the 1950s was inadequate to support the growing volume that traveled through Boston's downtown area. Planners also noted that the areas just north of the downtown were isolated by the elevated highway, which acted as a barrier to its development and gentrification. To resolve these problems, a bold plan was created to tear down and replace 25 percent of the 27 downtown acres of elevated highway freeing extremely valuable real estate for housing, commercial, and retail use (Hollmer, 2002). In place of the elevated highway was to be the Big Dig, comprising a half tunnel, half highway, and a bridge network with 161 lane miles all squeezed into a 7.5 mile section of the downtown.

The Big Dig quickly gained notoriety as one of the most expensive and most bungled construction projects of all time. Originally, the anticipated cost for the Big Dig was $3 billion as construction began in 1983, and the final cost estimated at completion is expected to be $15 billion over 22 years (Poole, 2004). The cost of the project was not comparable to the actual costs incurred in terms of political lives, hardships, frustrations for the citizens of Boston, and eventually the death of human beings.

14.1.1 Project Planning

The project management plan was based on flawed engineering specifications. Before the project was sent out for bidding, the initial research of the project was not comprehensive. In fact, the central artery was never properly surveyed. The central artery was surveyed by a combination of aerial photos and old "as-built" drawings dating back to the 1950s. This was a calculated risk and was not a sufficient survey for this project. According to contract records and interviews with contractors, the failure to survey the central artery cost taxpayers at least $16 million to correct and about $10 million more in overtime and extra shifts to avoid schedule delays (Lewis and Murphy, 2003).

Another problem during the project-planning phase was that bidders received the last packet of drawings just five days before the contract was awarded, the late package of plans and drawings was "substantially incomplete," and the project plans were no more than 65 percent complete at the time of the bid (Lewis and Murphy, 2003). If the plans were not complete, it would have been impossible to foresee potential risks accurately in the planning stage or to estimate cost and schedule adequately.

14.1.2 Project Execution, Monitoring, and Control

The major activities that took place during the execution phase were the actual construction of the Big Dig. These include such major components as the Central Artery/Tunnel, the Zakim Bridge over the Charles River, and the Ted Williams Tunnel under Boston Harbor. Along with the deliverables defined in the project management plan, the project team processed more than $2 billion worth of change orders and modifications during this phase. The lack of an adequate change control process was cited as one of the major reasons for cost overruns during a 2005 congressional hearing on the Big Dig project. In particular, the shortcomings of the project team to address risk-management activities during project execution are numerous. Some of the major cost drivers as outlined at the congressional hearings were no allowance for inflation adjustments ($6.4 billion), growth in scope ($2.7 billion), environmental compliance issues ($3.0 billion), accelerating schedule efforts ($0.6 billion), and accounting adjustments ($1.2 billion) (Congressional Hearing, 2005).

The cost overruns were more directly attributed to politics, added scope, or problems in oversight. The congressional hearing in 2005 revealed that organizational failures and lack of oversight were the main problems that contributed to the vast budget overrun for the Big Dig project. For example, it was often stated that change management was not handled appropriately during project execution. Change orders were approved without knowing who would pay for the changes. This problem is often mentioned in the same discussions with the Integrated Project Organization (IPO). The IPO was established in 1998 and resulted in Massachusetts Turnpike Authority (MTA) personnel and contractor personnel being formed into one organization. This effectively removed any oversight capability from the team, as both the project team and the contract team reported to one management team. George Tamaro, an engineering consultant on the project, pointed out that "when you have an integrated team, and you do not have someone who is very aggressive for cost control, this is one of the biggest problems with the project" (Congressional Hearing, 2005).

Safety was a concern throughout the life of the Big Dig project, yet several safety incidents occurred. For example, the collapse of a section of the concrete ceiling of a completed tunnel resulting in a death of a person transiting through the tunnel in July 2006. In 1999, a safety officer pointed out that the method to hold the concrete sections to the tunnel ceiling were inadequate (Murphy, 2006). He was told by his superiors that the method used was a tried-and-tested and would meet specifications. The safety officer pressed his case but was overridden by his superiors.

Another area that showed the shortcomings of the project team in addressing risk management issues during project execution relates to leaks in the Central Artery/Tunnel (Brown, 2005). The contractor used a technique known as "slurry wall panel" during construction (Bechtel/Parsons Brinckerhoff, eds. 2005). This technique, though recognized as a valid construction technique for these types of tunnels, resulted in a large number of leaks that needed remediation. Approximately 1,100 leak seals were applied after the problem was identified to address the issue. A larger concern was the possibility of structural support corrosion that could result in an enormous repair bill within a relatively short period of time.

In addition to the technical and schedule risks that were addressed in the plans, contractors also had to take into account "political" risk. Local and state politicians viewed the Big Dig from a public relations point of view. When it was reported that several of the tunnels were experiencing water leakage in segments that had been previously delivered, a media and political uproar caused the contractors to go back and patch the cracks (Bechtel/Parsons-Brinckerhoff, 2005). Engineering experts confirmed that some level of leakage was to be expected due to the tunneling methods employed, and in fact the extent of the leakage was far below the typical post-construction leakage. However, the contractors were forced to expend additional cost and deviate from the schedule to fix the leaks according to the politicians' timeframe.

14.1.3 Project Closeout

Despite the fact that the project was way over budget and finished long after the projected completion date, some accomplishments were made. Technological accomplishments included the deep slurry walls constructed in soft clay, the soil-freezing and tunnel-jacking operation at the Fort Point Channel crossing, and the Leonard P. Zakim Bunker Hill Bridge, the widest cable-stayed bridge in the world. It must also be noted that extensive construction took place in a dense urban area with minimal damage to existing structures and utilities, traffic was kept flowing through a busy city for more than a decade, and a major railroad yard continued operations while a tunnel was built beneath it (National Academies, 2003).

The project was also sensitive to the needs and desires of the communities that were affected by the construction activities. The Owner-Controlled Insurance Program (OCIP) was an effective and cost-reducing response to the challenge of obtaining adequate insurance coverage for the large numbers of engineering and contracting firms involved in the project. The project's safety record for year 2002—5.5 recordable worker injuries per 100 full-time employees—was significantly below the national average of 8.2 (National Academies, 2003).

Numerous shortcomings during project closeout stemmed from previous mistakes in the project. The uncertain financial burden and potential for delay posed by the excessive number and monetary value of outstanding contract claims and related issues means the closeout of this project will continue for a very long time to come (National Academies, 2003). The project's exposure to unsettled claims and changes is significant. Also, the transition process from construction to operation and maintenance was not properly organized and managed (National Academies, 2003). Figure 14.1 shows an overview of cost history, scope evolution, and project schedule escalation from 1985 to 2002 (National Academics, 2003).

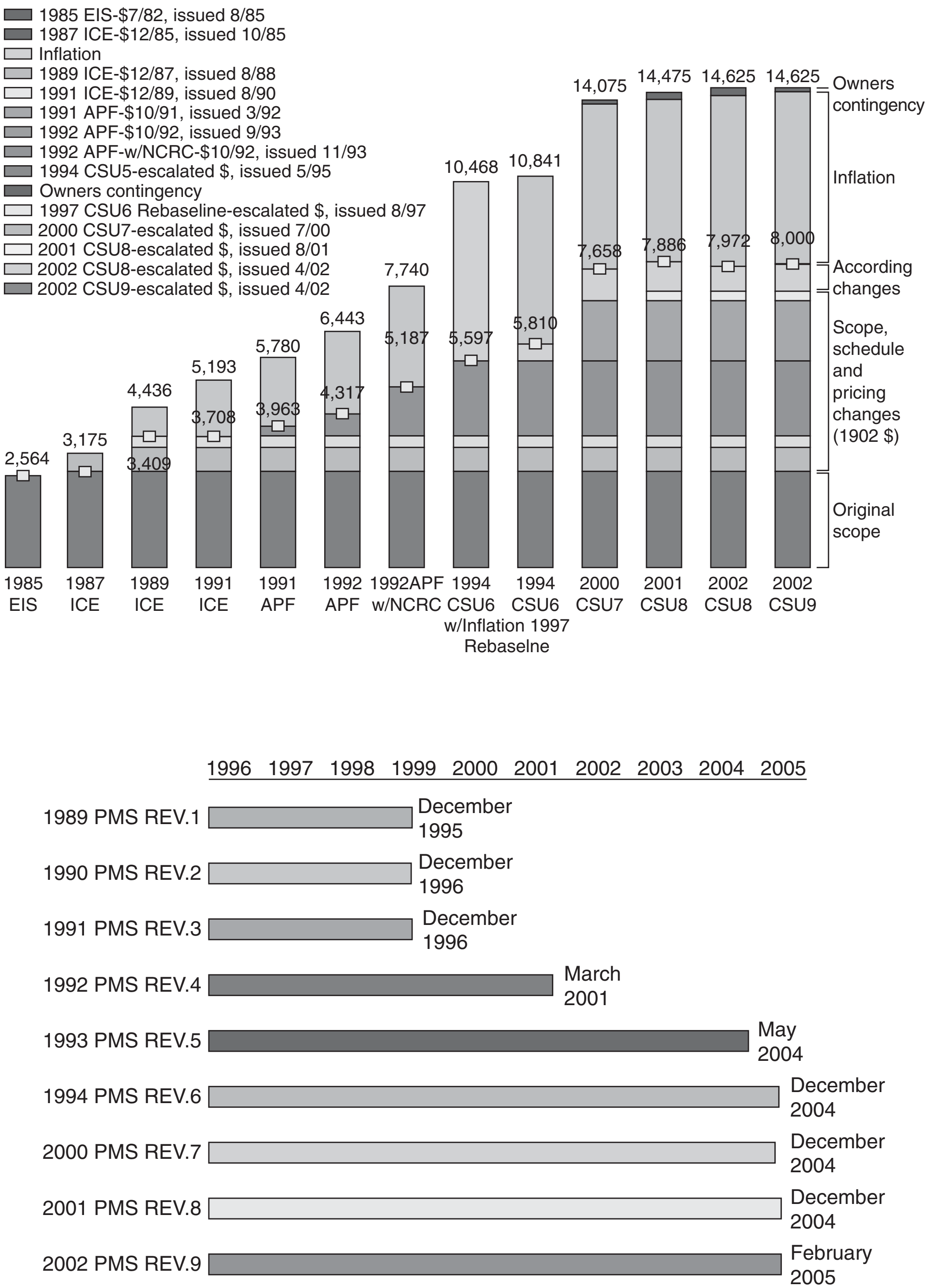

FIGURE 14.1 Cost history, scope evolution, and project schedule escalation (National Academics, 2003).

14.1.4 Project Evaluation and Summary

The leadership structure and relationships could have been controlled differently, resulting in better project management. A clear definition of stakeholders' responsibilities and authorities for the state, federal agencies, local politicians, contractors, construction companies, and commuters was not provided. The relationship between the public and the stakeholders could have been improved. The challenges should have been presented realistically. The project management should have been clearly delineated and who and what they controlled more clearly defined. It is difficult to identify any individuals who served in this role and more difficult to identify who reported to them and what were their responsibilities.

The day-to-day management could have also been improved. Evidence suggests that risk management practices of the "Big Dig" became reactive as opposed to proactive. This became evident in the gaps in sections of the tunnel and the failure to survey. The project should have relied more on proven and traditional practices instead of unproven and experimental technologies. Above all, the project needed better cost and schedule management. The project that Boston planned to solve its transportation and economic woes came at a huge price.

14.2 THREE GORGES DAM IN CHINA

The history of the Three Gorges Dam Project dates back to 1919. Dr. Sun Yat-Sen, founding father of the Republic of China, first suggested the Three Gorges Dam in his 1919 article "Industrial Plan." In this article, Sun proposed improving shipping conditions on the Yangtze River and the development of hydroelectric power on the Three Gorges (Barber and Ryder, 1993). In 1924, Sun further expounded the importance of using the water resources in his thesis, "Principle of People's Livelihood."

Initial feasibility studies of the Three Gorges Dam Project began in the early 1930s. In October 1932, a prospecting team was organized by the government to survey the hydroelectric power generating capacity of the upper reaches of the Yangtze. In April 1933, the first power generation plan was produced using the data gathered by this team (Qing, 1989). Between 1936 and 1944, a number of Western experts were engaged to evaluate the feasibility and economic potential of the Three Gorges Dam.

In 1945, the Chinese government invited the U.S. Bureau of Reclamation's world-famous dam expert, J.L. Savage, to evaluate the feasibility of the Three Gorges Dam. He compared five proposed plans and offered a plan of work for further survey and design. Both Chinese and American governments discussed future joint cooperation and training programs. Such activities continued through 1946 until the plan was suspended due to civil war in China. With the establishment of the People's Republic of China, the Three Gorges Dam received attention at the highest level of the government. The need for this project was further emphasized by a series of catastrophic floods during the late 1940s and early 1950s.

In November 1979, the Ministry of Water Resources submitted the Three Gorges Dam plan to the Chinese State Council, which launched a series of high-level reviews in 1982 and 1983. The Chinese State Council approved the project in April 1984. However, in order for construction to begin, the project also needed to receive approval from the Chinese National Congress. This final approval was scheduled to take place in the spring of 1985. However, the Chinese National Congress decided that additional feasibility studies were needed before making a final decision (Barber and Ryder, 1993).

Between 1986 and 1990, the Chinese government reexamined previous studies and collected and compiled new data. The findings were presented to the State Council in July 1990, followed by the formation of the Examination Committee, a group appointed by the Chinese government to research the feasibility of the Three Gorges Dam. The Examination Committee submitted a feasibility report to the State Council for formal approval in August 1991. On April 3, 1992, the fifth session of the Seventh National People's Congress approved the project and detailed planning efforts began. On December 14, 1994, Premier Li Peng declared the formal start of the Three Gorges Dam construction.

Construction of the Three Gorges Dam followed a three-stage schedule. During the first stage (1992–1997), a cofferdam was built along the Zongbao Island on the right side of the channel and an open diversion channel was excavated. Construction also began for the permanent ship locks, a ship lift, and a temporary ship lock on the left bank. Stage two (1997–2003) began with the closure of the main river channel followed by the construction of the spillway, the intake, and the left power plant. Construction of the permanent ship locks continued throughout this stage. The third stage (2003–2009) began with the commissioning of the power plant and permanent ship locks, and includes the filling of the reservoir, the construction of the third-stage cofferdam in the open diversion channel, and the left in-take dam-section.

Overall, the Three Gorges Dam is the largest project in the history of mankind. Estimates for the Three Gorges Dam Project range from 21 to 24 billion U.S. dollars. Some sources say that the actual cost of the Three Gorges Dam will be around $80 billion (Qing, 1989). The duration of this project is 90 years from initiation to closeout. The construction phase of the project is slated to be 16 years in duration.

14.2.1 Project Initiation (1919–1984)

From 1936 to 1944, a number of Western experts were engaged to evaluate the feasibility and economic potential of the project. More than 10,000 scientific and technical personnel from more than 200 agencies and organizations worldwide would eventually participate in the effort (Lee, 1997). In 1949, severe flooding again devastated the countryside surrounding the Yangtze, which prompted China to attach high importance to flood control on the middle and lower reaches of the river (Qing, 1989). In the flood season of 1954, the Yangtze Valley suffered the most severe flooding of the century, reaffirming the notion that permanent measures were required to mitigate the risks associated with the river. As a result of the extensive flooding during the early 1950s, a comprehensive evaluation of the Yangtze River drainage area and serious research into the feasibility of the Three Gorges project began, with most of these core activities completed by 1957 (Wikipedia, 2006).

During this period, wide arrays of risks associated with the installation of this massive dam on the Yangtze were identified. The first major concern was the environmental impacts and consequences of building the Three Gorges Dam. Most notable in this category is the risk of landslides and earthquakes and resulting environmental damage that could be induced by the dam's proposed reservoir (Lee, 1997). Also, the dam would be located very close to seismic fault lines, thus increasing this risk (Adams, 1993). In addition, the dam could cause massive flooding upstream. Its presence would cause the surrounding water to flow slower, allowing sediment and soot to build up on the reservoir floor. As this debris continues to accumulate, it could decrease the water's depth, causing boats to run aground and increasing the potential for massive flooding upstream (Discovery Channel, 2006).

There were also significant risks with respect to the massive relocation effort required upstream in the areas where the reservoir water will rise. This caused the displacement of more than 1.3 million people from more than 100 towns and 800 villages, and caused the loss of nearly 100,000 hectares of fertile farmland (Adams, 1993). The most obvious risk was the ability to relocate these individuals effectively before the reservoir begins to fill and flood the respective areas.

During the years leading up to the project planning phase, one of the greatest risks that continuously surfaced and continued to threaten the project's conception was public opposition. As time passed and the Chinese government proceeded with its construction plans at the Three Gorges site, environmentalists from around the world began to protest more strongly. Human rights advocates relentlessly criticized the resettlement plan and overall intention to relocate more than 1.3 million people. Archeologists were concerned about the submergence of a large number of historical sites, which could then never be explored (Barber and Ryder, 1993).

To prevent the strong opposition to the Three Gorges Dam, which eventually resulted in critics launching a public campaign against the project, criticism of the project was outlawed by penalty of severe punishment. In general, during this phase there was a much greater concern focused around the project's potential impacts then on the risks associated with being able to complete the project successfully. Obviously, with a project of this magnitude, multiple concerns makes it impossible to mention all of them. However, it appeared that the project leaders made efforts to identify large-scale risks associated with this undertaking.

14.2.2 Project Planning (1984–1993)

The Three Gorges Dam planning stage began in 1984 with the State Council of China's approval to move forward with the project. This approval was based on the completion of a feasibility study conducted by the Yangtze Valley Planning Office (YVPO), which recommended that construction should proceed. One main company was set up specifically by the government of China for the execution of the Three Gorges Dam. The Three Gorges Project Construction Committee (TGPCC) was officially established on April 2, 1993. This committee consisted of three executive bodies: the Administrative Office, the Bureau of Resettlement and Development, and the China Three Gorges Project Development Corporation (CTGPC) (Barber and Ryder, 1993). This was a newly developed "company" that was established near the end of the planning phase. This corporation did define the project management system through which the project would be executed.

The Three Gorges Dam project leaders conducted numerous studies that were all aimed at identifying potential risks. In 1984, the Chinese State Council approved the construction of the TGP based on the feasibility study completed by the YVPO. Final construction approval was needed from the National People's Congress, which was scheduled to meet in the spring of 1985. However, the project's final approval was postponed until 1987 because of growing economic difficulties in China (Barber and Ryder, 1993). Concurrently in 1985, the U.S. government formed a consortium known as the "U.S. Three Gorges Working Group." This group included representatives from the U.S. Bureau of Reclamation, the U.S. Army Corps of Engineers, the American Consulting Engineers Council, Guy F. Atkinson Company, Bechtel Civil and Mineral, Inc., Coopers and Lybrand, Merrill Lynch Capitals Markets, Morgan Bank, Morrison-Knudsen Inc., and Stone and Webster Engineering Corporation. In July of 1985 this group submitted a proposal to the Ministry of Water Resources and Electric Power (MWREP). This proposal recommended conducting social and environmental impact studies, performing a cost-benefit analysis acceptable to potential financiers, and building the dam as a joint venture between the Chinese government and the American Consortium (Qing, 1989).

Early in 1986, the aforementioned recommended analyses began with the Economic Construction Group of the Chinese People's Political Consultative Conference (CPPCC) conducting a 38-day field trip to assess the social, political, economic, and various risks involving the Three Gorges Dam. This group visited eight major cities that would be affected by the project and heard from all municipalities as well as from experts and scholars. The committee then shared these conclusions with the Chinese State Council. The conclusions identified numerous risks that were not resolved (higher estimates than expected, flood control discrepancies, sedimentation issues in the reservoir, navigation difficulties, and power generation and geologic concerns) and recommended that the project should not proceed in the short term (Qing, 1989).

During the same time period in 1986, the Canadian International Development Agency (CIDA), Canada's foreign aid arm, arranged with China's MWREP for CIDA to finance a feasibility study to be conducted by a Canadian consortium. The purpose of this study was to form the basis for securing assistance from international financial institutions and to form an input to the Chinese government in its decision-making process. This study would accomplish this purpose through the identification of all potential economic, environmental, social, political, and technical risks associated with the Three Gorges Dam (Qing, 1989).

Additionally, in 1986, the Chinese State Council commissioned a group to conduct its own feasibility study. The Minister of MWREP appointed a 400-member group, which included senior government officials, engineers, and members of the Chinese Academy of Science, to conduct the study. Moreover, a 12-member panel of Chinese experts was also appointed to oversee this study and the CIDA study. Early in 1988, as the CIDA study neared completion, the panel identified serious gaps in the study and recommended additional studies be performed.

In 1989, the CIDA study and the Chinese State Council study were completed and both offered the same conclusions that the Three Gorges Dam is technically, environmentally, and economically feasible and that the project should proceed (Qing, 1989). Throughout the late 1980s, independent organizations of scholars and scientists published books and articles worldwide about the Three Gorges Dam. One of the main reasons for the CIDA study was to develop a basis so that the TGP could receive the necessary financial support for this enormous project. In short, the financial risks of this project were known to be large, and to alleviate this risk, a number of independent studies were solicited to garner attention from funding agencies around the world.

14.2.3 Project Execution (1993–2009)

The Three Gorges Dam Project is scheduled to be fully operational by 2009. With construction well ahead of schedule, the project team finished the structural work for the dam project in May 2006. Experts have noted that present-day China is a more stable and modern country capable of sustaining this large-scale project.

In preparation for the construction, the Chinese government replaced aging equipment and antiquated construction methods for modern equipment and industrialized processes. A large amount of equipment was purchased from U.S. companies such as Textron, Caterpillar ($30M), and ROTEC ($30M) (U.S. Embassy Report, 1996). The financing continued to pour in from investors such as Morgan Stanley Dean Witter, Citigroup, and Merrill Lynch. Regardless of the fact that potential investors such as the Export-Import Bank of the U.S. denied funding to the dam project due to environmental concerns, cash flow did not appear to pose a problem (Kearins and O'Malley, 2000).

Environmentalists cited concerns of the impact on the land, while archeologists noted the potential loss of 10,000 years' worth of cultural artifacts. Stakeholders such as the United Nations Educational Scientific and Cultural Organization (UNESCO) cited that more than 1.5 million people would eventually have to be resettled, and that there is a great potential for massive pollution in the area due to the reduction in water flow (Bequette, 1997). While the risk identification was extremely helpful throughout the course of this project during this execution phase, little is known about the planning methodologies employed.

14.2.4 Project Closeout

The closeout phase of a project involves performing the project closure portion of the project management plan if a formal plan exists. In multiphase projects, such as the Three Gorges Dam, the closeout phase closes out each portion of the project scope that is associated with a given phase. Additionally, the closeout phase of a project occurs when all execution aspects of a project are complete and the project has been physically installed and is operating as designed. Lessons learned activities, contract closure, and historical cost database updates are examples of events that would be performed during the closeout phase of a project.

14.2.5 Project Evaluation and Summary

The establishment of one governing company or body solely responsible for overseeing the Three Gorges construction project was not established until 1993. Formal Chinese State Council approval did not occur until 1993. The project leaders should have commissioned a company such as the CTGPC to remain intact during the planning phases at a minimum and optimally during the initiation phase. Arguably, the YVPO served as a governing body and was established in the initiation phase. However, no consistent structure carried this same organization through to the development of the CTGPC. The CTGPC was formed separately upon authorization of the project. If there had been continuation of a single governing entity throughout the life of the Three Gorges Dam, project leaders could have established and implemented formal project management practices. A project team responsible for overseeing all aspects of project management for this endeavor would have been instrumental in providing the necessary formalities and procedures to monitor and control cost, schedule, and risk throughout the project in an appropriate manner.

It does appear that a concerted effort was made to identify many of the large-scale risks throughout all phases of the project. Due to the size and scope of the project, many of these risks could be easily identified, while others were not as obvious. By taking the time to make these potential concerns known, efforts could be undertaken that would aid in mitigating these risks whenever possible. The level of risk response planning appears to be fairly level across all stages of this project. As mentioned previously, continual efforts were made to take extra precautions in the hopes of mitigating many of the major risks associated with this project. Although it is difficult to define all planning aspects that took place, the fact that the dam's construction is ahead of schedule could be evidence to the risk management efforts.

14.3 ACKNOWLEDGEMENTS

This chapter is primarily based on two final group project reports of the risk management course at The George Washington University's project management program during the summer of 2006. In particular, the author would like to thank Michael Aufiero, Richard Huh, and Keith Mayo for the Three Gorges Dam Report and David Bolon, Stephen Cholet, Matthew Donohue, and Jaime Jerde for the Boston Big Dig Report. Their hard work and critical analyses are greatly appreciated. The author would also like to thank all the graduate students who took the risk management course in the past and contributed their valuable insights and comments to better understand and promote the principles, practices, processes, tools, and techniques of project management and risk management.

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CHAPTER 15

PROJECT RISK MANAGEMENT FOR ALASKA OIL AND GAS CAPITAL PROJECTS

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ABSTRACT

This paper reviews and identifies risk classifications and potential positive and negative risks for use in managing project risk for actual Alaska oil and gas projects, relying on literature reviews, surveys, and interviews. The paper synthesizes a risk breakdown structure and risk register with remediation strategies that may be used as a checklist in the project risk management process for future oil and gas capital projects. The paper looks at what types of risks are unique to Alaska projects.

15.1 INTRODUCTION

Risk is an important knowledge area for the successful management of projects. Market forces, competition, globalization, and enhanced information flows require organizations to increase the scope and quality of their projects, while likewise reducing the cost and schedule. This compression of the triple constraint and the push to provide projects that are better, cheaper, faster, safer, and greener increases the breadth and likelihood of risks. With multiple objectives and external pressures, organizations need enhanced project management tools and disciplined project managers to ensure the successful completion of their projects. Failure to assess project risks accurately poses serious consequences, while accomplishing all five measures leads to tremendous rewards. There is a balance between risks, rewards, and the resulting impacts to the project, its social recognition, and the organization's future growth.

Declining production has created a challenge to identify new reserves. The Alaskan North Slope production reached a peak in 2.03 million barrels of oil per day in 1988 but had fallen to 44 percent of that amount (0.89 million barrels per day) by 2005 (State of Alaska Department of Revenue, 2006a). Because of the oil and gas industry's constant pressure to increase production and the magnitude of the capital projects in Alaska, project managers and planners must understand fully the risk factors that can affect successful completion of these projects. The consequences are extreme.

Oil and gas projects represent some of the largest projects completed in Alaska. Not only are the investments in these projects very large, but they are also very important to the economy. The oil and gas industry's payments under the oil and gas production tax, corporate income tax, property tax, and royalty tax contributed 89 percent of the state's Fiscal Year 2005 General Fund unrestricted revenue (State of Alaska Department of Revenue, 2006), and oil and gas extraction is the single largest contributor to Alaska's economy (U.S. Department of Commerce, 2006). Both oil and gas producers and the residents of the state benefit from successful management of project risk.

The oil and gas industry has embraced the use of risk management tools because of its heavy investment in capital projects. Oil and gas capital projects conducted in Alaska face risks that are unique to most of the developed nations and the rest of the United States. As a major economic force in the state, the industry has constructed or planned several major capital projects, including the Trans-Alaska Pipeline and the proposed Alaska Gas Pipeline. The Trans-Alaska Pipeline, shown in Figure 15.1, was built in the 1970s and runs 800 miles from the North Slope to Valdez.

The Alaska Gas Pipeline, which would bring North Slope gas to Alaska, Canada, and the Lower 48, is currently estimated to cost $20 billion and require 10 years for construction (see Figure 15.2) (State of Alaska, 2006).

Alaska projects face both risks common to other projects around the world and risks unique to the Alaska environment, infrastructure, work force, and economy. For Alaska oil and gas projects, the following conditions are often true:

- The project is multi-organizational. For example, Alyeska Pipeline Service Company, funded by a consortium of major oil producers, operates the existing Trans-Alaska Pipeline System. The proposed Natural Gas Pipeline is a project shared by three large producers: BP, ConocoPhillips, and Exxon.
- The project is multi-disciplinary. The oil and gas project encompasses finance, engineering, procurement, construction, fabrication, and management. Furthermore, capital projects should be treated as digital projects. Organizations are moving from a traditional document-centric environment to an electronic data-centric environment, which will result in all project documents, data, and other information being generated, transferred, and maintained electronically throughout the facility life cycle.
- The project relies on personnel and materials sourced from multiple regions. There is extremely limited manufacturing infrastructure in Alaska. Unlike other areas with a more diversified industrial base, only 2.2 percent of Alaska's gross state product comes from its manufacturing industry (U.S. Department of Commerce, 2006).
- The project relies on region-specific knowledge and expertise. For example, the proposed Alaska Gas Pipeline would span Alaska, Canada, and the Lower 48, therefore requiring knowledge of diverse planning, regulatory, and operating environments.

FIGURE 15.1 Trans-Alaska Pipeline (*Source:* Joint Pipeline Office, undated).

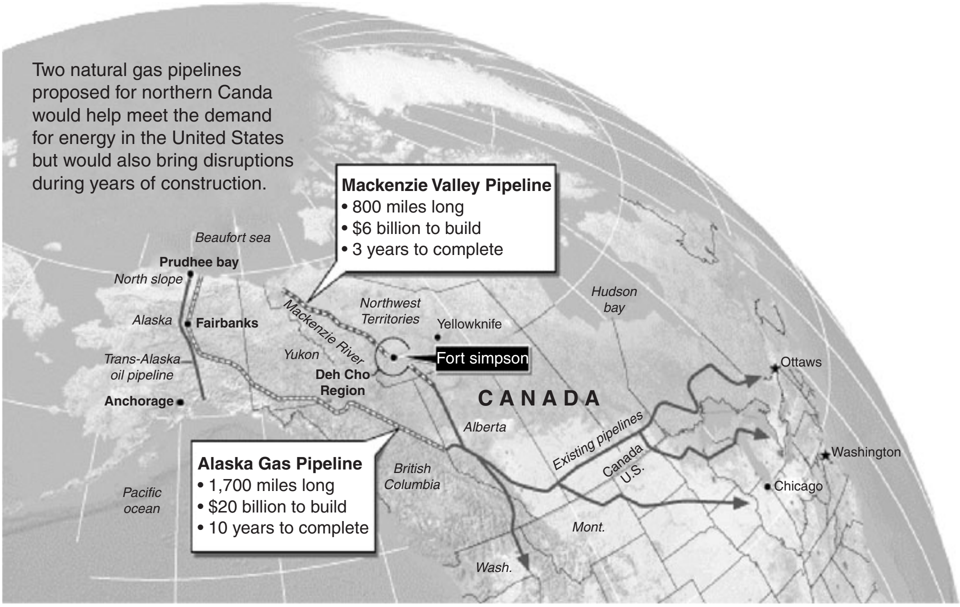

FIGURE 15.2 Map of the proposed Alaska Gas Pipeline (Kelso, 2005).

This chapter generally follows the six project risk management (PRM) processes described in *A Guide to the Project Management Body of Knowledge* (PMBOK Guide [Project Management Institute, 2004]) to develop project risk management tools for Alaska oil and gas capital projects. The processes are only partially covered because of the theoretical nature of this work. A more rigorous application of the qualitative risk analysis and risk response planning processes would require more detailed information about an actual project.

15.2 SOURCES OF PROJECT RISK

This chapter provides a comprehensive set of project risk management tools for oil and gas projects conducted in Alaska, including a risk breakdown structure (RBS) and a risk register. A typical RBS, which provides a hierarchical classification system for project risks, is shown in Figure 15.3. A risk register presents a descriptive list of risks, qualitative rankings, proactive risk responses to manage the risks to a project's benefit, and post-response qualitative rankings.

The influence of the four types of risks shown in Figure 15.3 depends on internal and external environmental factors, such as the nature of the project, technical challenges, organizational culture, regulations, stakeholders, risk tolerances, and marketplace conditions. Projects conducted by one organization experience a different set of controlling factors and risks than do projects conducted by a team of organizations. The relevant importance of the four broad-level risk categories varies with the degree to which the project is technically challenging, conducted within a controlled environment, handled within an organization, and managed according to project management principles. Examples of influences on two hypothetical projects are shown in Figures 15.4 and 15.5.

In Figure 15.4, a single organization is responsible for the project. Risks come from within the organization and from its environment, as well as from technical and project management issues. Alternatively, Figure 15.5 shows a project shared by two organizations. The risk factors present in the first project apply to this project, but additional risk comes from the interaction between the two organizations, two technical fields, and two project management approaches. As illustrated by these examples, one must understand the relative importance of the four broad types of risks to understand the risks for a specific project.

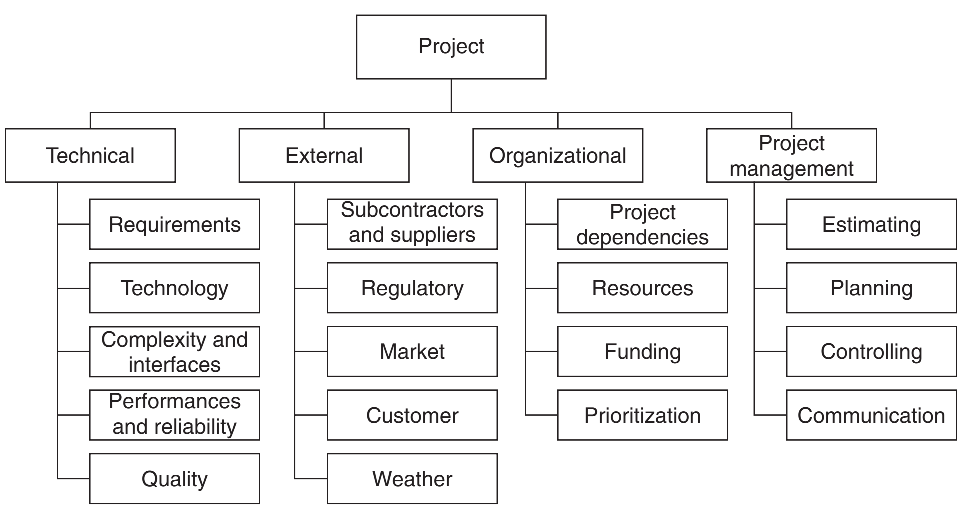

FIGURE 15.3 Risk breakdown structure (Project Management Institute, 2004, p. 244.).

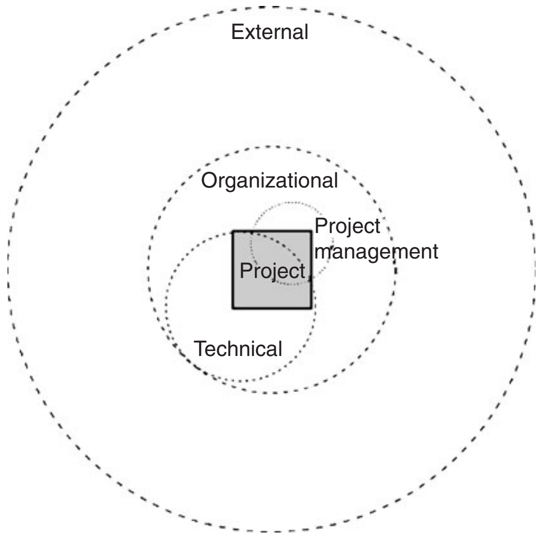

FIGURE 15.4 Influence of project risks for a project within an organization.

Alaska oil and gas capital projects are affected by the four broad risk categories in a similar manner to other projects. The same organizational and project management factors are present in Alaska projects as are present in projects conducted elsewhere. (Further distinction could be drawn by a thorough study of the actual organizations involved in Alaska projects, but this level of detail goes beyond the scope of this chapter.) Therefore, the authors assert that Alaska projects are unique because of these external and technical risk factors.

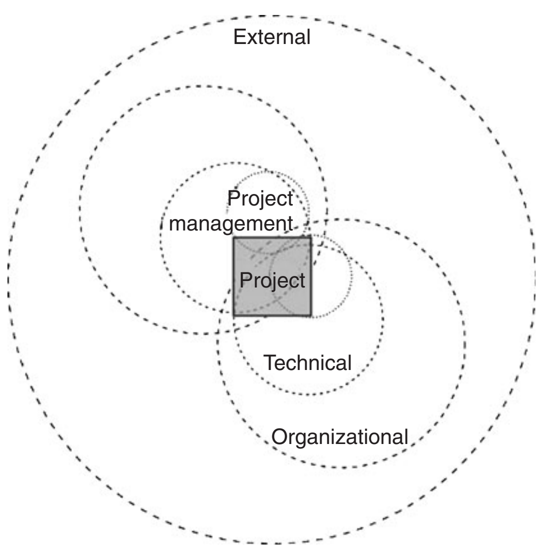

FIGURE 15.5 Influence of project risks for a project conducted by two organizations.

15.3 RISK ANALYSIS AND METHODOLOGY

This chapter generally follows the PRM processes outlined in the *PMBOK Guide* (Project Management Institute, 2004) for two reasons. First, the processes are part of a globally recognized standard, and it is beneficial for this work to be aligned with the standard rather than attempting to institute a new standard. Second, by aligning with the standard, the RBS and risk register developed in this chapter are more easily applied and can be of greater value for project management practitioners. The six PRM processes are described here, followed by a discussion of the processes considered.

The PRM processes discussed in this section are not intended to reflect a comprehensive overview or rigorous examination of competing project management methodologies and theories. The material is presented simply to provide a framework against which to map this project's activities. This mapping exercise could be done with any of the existing methodologies.

The *PMBOK Guide* organizes its 44 generally applicable project management processes into nine knowledge areas. One of those knowledge areas is PRM, which contains six processes, as shown in Figure 15.6.

15.4 RISK MANAGEMENT PLANNING

Risk management planning is "the process of deciding how to approach and conduct the risk management activities for a project" (Project Management Institute, 2004, p. 242). The process is very specific to an organization and a project. This section focuses on the creation of an RBS with which to organize potential risk items.

A risk breakdown structure is "a hierarchically organized depiction of the identified project risks arranged by risk category" (Project Management Institute, 2004, p. 117). The tool helps to categorize risks for tracking purposes and to identify common root causes that may be targeted by risk response strategies. Creation of an RBS can take place at the onset of each project, or a comprehensive version can be developed at an organizational level and customized for each project. The following discussion uses a literature review, interviews with oil and gas industry professionals, and the results of a survey to identify RBS categories.

15.4.1 Survey Methodology

The first survey used in this chapter had a dual purpose. Its primary purpose was to identify risks, and the secondary purpose was to determine relevant categories for an oil and gas–specific RBS. To gather this information, the survey asked how respondents would classify the risk items they identified.

15.4.2 Literature Review

The literature review was the primary source of categories for the RBS. Searches of academic and peer-reviewed journals failed to produce results, leading the authors to use Internet keyword searches. The type of resource targeted by these searches was one describing an actual oil and gas project conducted in an environment similar to that of Alaska, with some of the key environmental factors including weather, temperature, infrastructure, remoteness, and logistics.

The effort revealed a lack of information about both common risk items and Alaska projects in particular. Further study of Alaska projects is needed to understand and capture relevant risk items. Therefore, the authors focused on projects in areas with environmental factors common to those in Alaska.

The literature survey identified 21 resources from which to start to address specific oil and gas industry risks. The following list of articles highlights a selection of the projects and other studies used to develop the risk register.

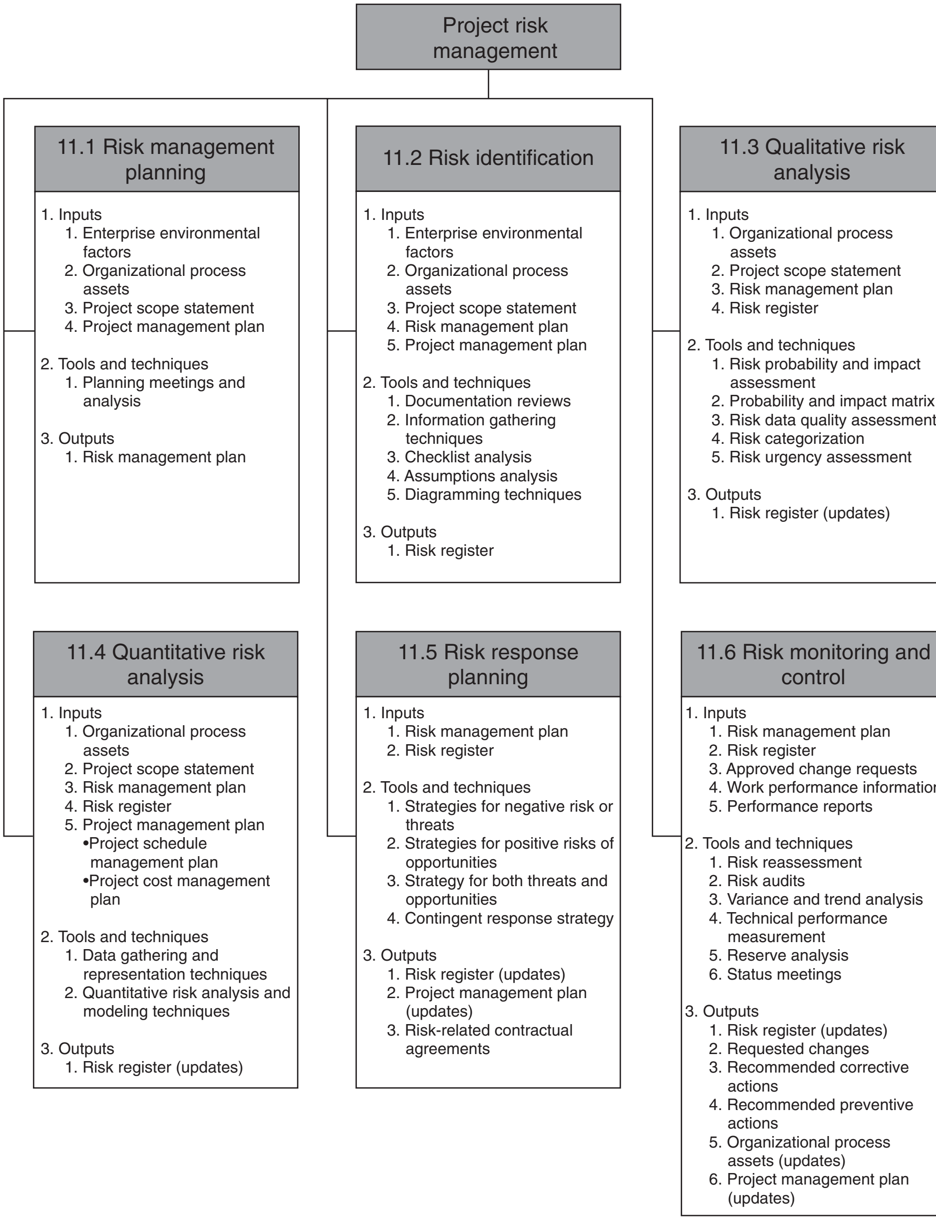

FIGURE 15.6 Project risk management processes (Project Management Institute, 2004, p. 239).

- *Capital Project Execution in the Oil and Gas Industry* (McKenna, Wilczynski & VanderSchee, 2006)
- *Managing Political Risk in the Oil and Gas Industries* (Berlin, 2003)
- "Azerbaijan risk: Infrastructure risk" (Economist Intelligence Unit, 2006)
- "Risk Assessment for Preventing of Oil and Gas Pipeline Accidents" (Dmitruk, 2002)

- "Project Risk Management in Deepwater Field Developments" (Hauge & Cramer, 2002)
- "Uncertainty, Risk and Decision Management on the Ormen Lange Gas Field Offshore Norway" (Berg & Kjarnes, 2003).
- "Goldeneye Innovation and Technology" (Hand, 2005).
- "Halliburton Company Risk Management Function" (Halliburton Company, 2006)
- "Hibernia Off-shore Oil Platform" (Hornbacher, 2004)
- "Preliminary Findings and Determination" (State of Alaska Department of Revenue, 2006b)
- "Arctic Harshness Hinders Search for Oil" (Talley, 2006)
- "Risk Management in Exploration Drilling" (Thorogood, Hovde & Loefsgaard, 2000)

15.4.3 Risk Breakdown Structure

The authors ultimately chose the RBS from the *PMBOK Guide* (Project Management Institute, 2004, p. 244) as a basis for developing the RBS presented in this chapter because of its broad coverage of risk categories. The authors added several categories based on the literature review and their synthesis of additional categories based on risks identified in surveys and interviews.

The RBS developed is shown in Figure 15.7. Categories with thick outlines were taken from the RBS developed by PMI (2004). The authors of this paper added the categories shown with a dashed outline.

Description of Risk Breakdown Structure Categories. The top-level categories of the RBS shown in Figure 15.7 were explained briefly earlier in this chapter and are elaborated here with second-level categories.

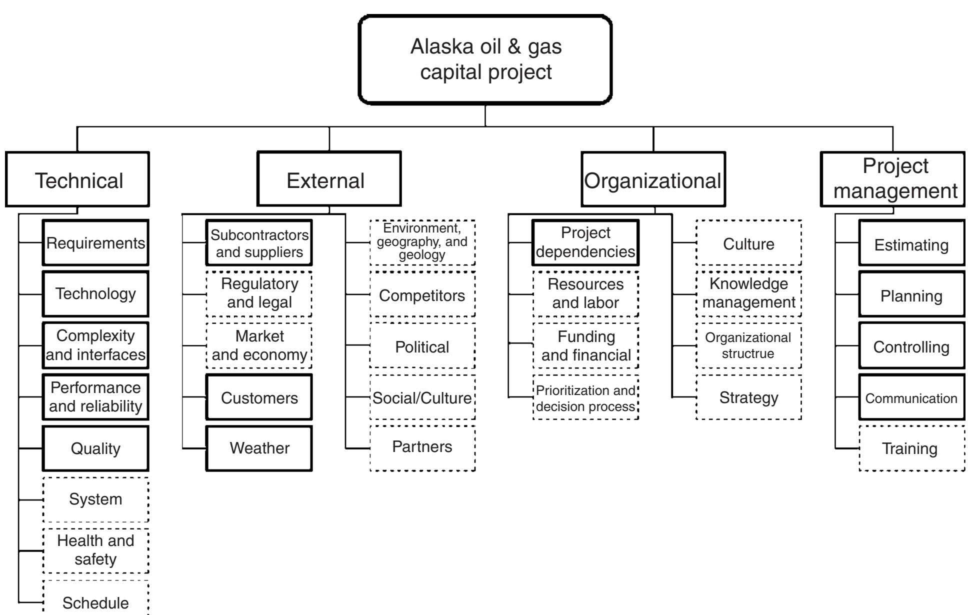

FIGURE 15.7 Risk breakdown structure (Modified and expanded from Project Management Institute, 2004).

Technical risks are concerned with the technical aspects of the project's purpose or execution. Subcategories of technical risks shown in the RBS include the following:

- Requirements for the final product or system
- Maturity or novelty of the technologies involved
- Complexity of the project and its interface with other projects
- Performance or reliability requirements for the final product
- Quality standards and thresholds for acceptability of the final product
- Interactions with and effects on the existing system
- Health and safety issues related to project execution
- Adequacy of time available for project completion

External risks refer to risk items related to environmental influences outside the control of the project organization. Subcategories of external risks include the following:

- Reliance upon subcontractors and suppliers who are not under the direct control of the project organization
- Application of regulatory or legal requirements in general or specific to the project
- Economic and market conditions governing supply and demand for the final product
- Needs of the final product's customers, if external to the organization
- Weather events and related natural forces
- Environmental, geographical, or geologic features relevant to project execution
- Actions of competitors and prevalence of competing products
- Political influences including support or opposition to the project
- Social and cultural factors affecting execution and implementation of the final product
- Actions of partners who are involved with the project but are separate entities and subject to only limited control by the project organization

Organizational risks refer to factors within an organization that may influence a project. Subcategories of organizational risks include these:

- Dependence on other projects currently underway in the project organization
- Availability and qualifications of resources and labor controlled by the project organization
- Ability to raise funding and commit financial assets to the project
- Internal priorities and the decision process for selecting and supporting projects
- Organizational culture and attitudes toward projects and risks
- Adequacy of the project organization's knowledge management processes and ability to store and access historical information, documentation, and lessons learned
- Internal structure as it affects on communication, approval processes, and decision-making
- Strategic goals and objectives of the project organization

Project management risks are concerned with risks arising from the application, or lack of application, of project management practices. Subcategories of project management risks include these:

- Availability and adequacy of information used in the estimation process to develop appropriate scope, schedule, and budget baselines
- Adequacy of the planning process to develop an appropriate scope, schedule, and budget and to identify factors within the other knowledge areas that affect the project

- Monitoring and controlling processes in place during project execution to ensure adherence to project baselines
- Effectiveness and efficiency in project communication between the project manager, project team, and stakeholders
- Adequacy of training in project management best practices and process standards

15.5 RISK IDENTIFICATION

Risk identification is an iterative process that "determines which risks might affect the project and documents their characteristics" (Project Management Institute, 2004, p. 246). This chapter relies on two primary sources for risk identification: a survey and a series of interviews with oil field professionals, as described next.

15.5.1 Survey Methodology

The first survey solicited a list of risks specific to Alaska oil and gas capital projects. The survey went to 80 students, faculty, alumni, and advisory board members of the Engineering, Science, and Project Management (ESPM) Department at the University of Alaska Anchorage on July 7, 2006, with responses due by July 13, 2006. The ESPM Department offers graduate degrees in Engineering Management, Science Management, and Project Management. Its students include professionals with extensive experience with Alaska projects, especially in the oil and gas industry. Most of the instructors in the programs are adjunct faculty who work on and manage Alaska projects professionally.

The survey was free-form and asked respondents to submit a list of five to ten risks unique to Alaska oil and gas projects, considering both construction and digital projects. Respondents were also asked how they would classify the risks in an RBS.

15.5.2 Interviews

The authors traveled to the Kuparuk Oil Field, operated by ConocoPhillips Alaska, Inc., on July 9 and 10, 2006, to conduct a site visit and interview key personnel about project risks. The field is located on Alaska's North Slope and operates in a remote and harsh arctic environment. Its unique operating environment introduces a number of risks that are not encountered in oil and gas developments outside the state. During this visit, the authors met with a number of ConocoPhillips Alaska, Inc., employees and contractors. The interviews generated several risk items and RBS categories.

15.5.3 Survey and Interview Findings

Responses from the first survey and interviews at Kuparuk provided 69 risks. The authors edited and consolidated the risks into the risk register shown later in this chapter.

An analysis of the list of risks generated through the interviews and first survey provides insight into what makes Alaska unique with respect to risk types. Of the items consolidated in the final risk register, external and technical factors constituted the majority of risks (81 percent), as shown in Figure 15.8, supporting the original assumption that Alaska oil and gas projects are unique in their external and technical risks. Organizational factors contribute an additional 13 percent of risks.

The next level of categorization is shown for each of the top-level risk categories in separate pie charts. For external risks (Figure 15.9), nearly 80 percent of them are related to the environment,

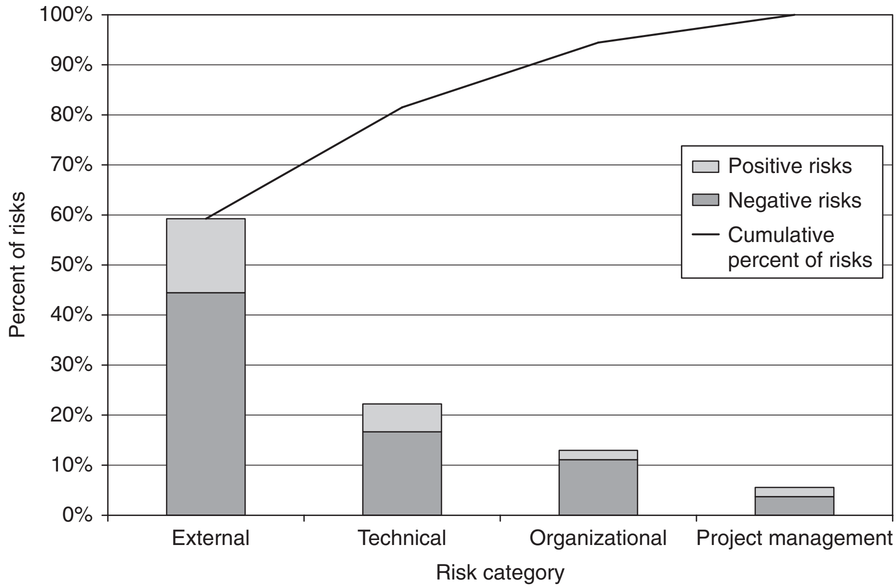

FIGURE 15.8 Relative importance of risk categories.

geography, and geology of Alaska. Technology is the major subcategory for technical risks (Figure 15.10), covering more than 80 percent of the responses. The top subcategories for project management risks (Figure 15.11) are evenly divided between planning, controlling, and communication. A pie chart is not shown for the organizational category since the surveys and interviews resulted in risks in only one subcategory, resources and labor.

The analysis of the risk subcategories provides additional insights, especially in the case of external and technical risks, about what makes Alaska projects unique.

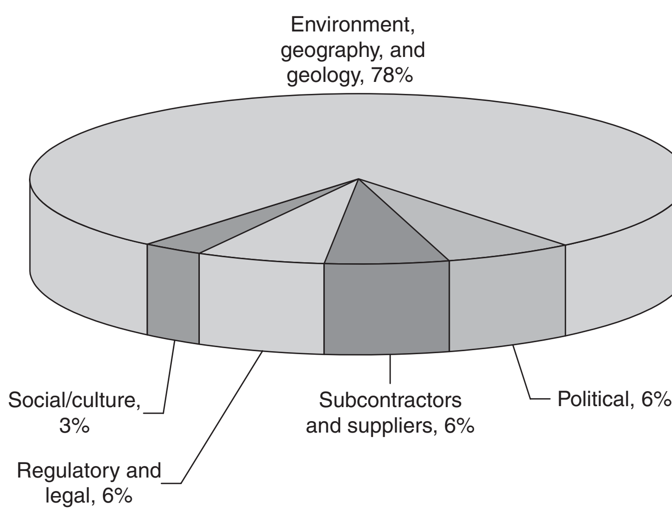

FIGURE 15.9 Detailed risk categories for external risks.

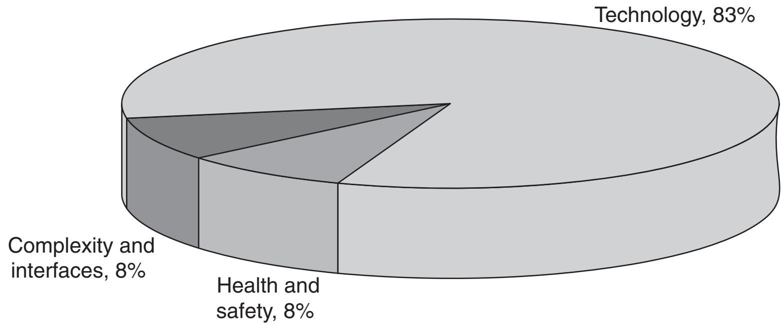

FIGURE 15.10 Detailed risk categories for technical risks.

15.6 QUALITATIVE RISK ANALYSIS

Qualitative risk analysis "includes methods for prioritizing the identified risks for further action" (Project Management Institute, 2004, p. 249). The prioritization is accomplished by assigning qualitative rankings for the probability and impact of the risks and an overall risk ranking based on the combination of the two. Probability refers to the chance that a given risk will occur and is usually expressed as a range of percentages. In this chapter, three qualitative categories of probability were used: high, medium, and low. Impact refers to the consequence of the risk occurring, reflected as a deviation from the baseline cost, schedule, scope, quality, or other measure. Again, this chapter uses three qualitative categories for impact: high, medium, and low.

Probability and impact rankings, and the combined ranking calculated from them, are important in determining which risks to study further, including quantitative analysis and risk response planning. The definition of what constitutes high or low priority risks is specific to an organization or project. This chapter uses the following generalized matrix (Figure 15.12) to assign overall risk rankings and prioritize risks.

The qualitative probability and impact classifications used for this chapter are intentionally simple. The authors developed the quantitative ranges for each of the categories based on their analysis of the survey findings to avoid biasing the results. The ranges are intended for use as a rough guideline for Alaska projects.

An organization or project manager could generate a different impact-ranking system based on each affected knowledge area. This customization is especially important when one or more of the measures of the triple constraint is deemed to be of greater importance than the others.

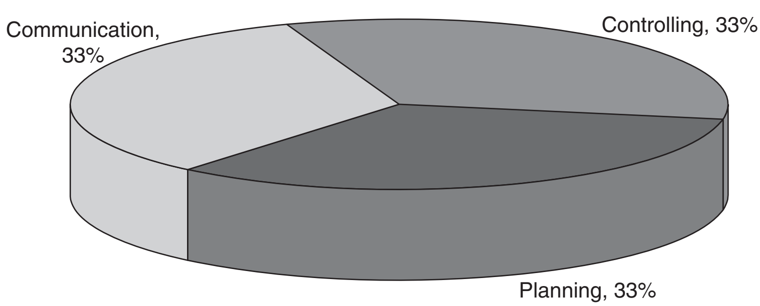

FIGURE 15.11 Detailed risk categories for project management risks.

15.6.1 Survey Methodology

The authors used a second survey to solicit quantitative probability and impact rankings for each of the risks identified in the first survey and interviews. That information was used to generate risk response strategies and mitigated probability and impact rankings for a few of the risks. The survey was sent to students, faculty, alumni, and others associated with the ESPM Department on July 19, 2006, with a revised deadline for responses of August 4, 2006.

The survey asked respondents to fill in a Microsoft Excel spreadsheet containing the risk register generated from the list of risks in the first survey. The risks identified by the first survey were included verbatim in the second survey, with only minor editing for consistency in the level of detail and active voice. Risks were presented in a random order. Respondents were specifically asked to provide estimated probabilities of occurrence, the type of risk (cost, schedule, and so on), the percentage impact of the risk relative to the baseline, risk response strategies (for three to five of the risks), and quantitative post-response probability and impact ratings. The first few rows of the survey spreadsheet are shown in Figure 15.13. The type of impact was later removed from the analysis because the responses were consistent across all risks, so the analysis would not have provided any new information.

Probability		Impact L	Impact M	Impact H
	H	M	H	H
	M	L	M	H
	L	L	L	M

FIGURE 15.12 Qualitative risk probability and impact matrix.

As described earlier, one purpose of the survey was to solicit quantitative probability and impact rankings for each of the risks. The survey collected information on the types of impacts the respondents expected the risk would have, such as impacts to the cost, schedule, or quality of the project, and risk response strategies and their effect on the risk item. The authors cleaned the data by omitting blank responses and removing non-responsive comments such as question marks, *N/A*, and *I don't know*. In a few cases, the responses indicated a range. The higher end of the range was used in the analysis. This had no impact on the analysis, since in all cases the ranges were between 0 and 5 percent, which was grouped together, as explained below.

The authors chose to determine the quantitative ranges for the qualitative probability and impact categories by sorting the quantitative survey responses for all risks combined into bins of 5-percent increments. The bins were then assigned to qualitative categories by assigning the first third of the bins, as measured by cumulative probability, as Low, the middle third as Medium, and the top third as High. The ranges of probabilities that fit within those thirds were then used for the qualitative definitions.

Figure 15.14 shows the number of responses and cumulative percentages of the bins used for determining the probability categories. One-third of the responses fell within the range of 0 to 20 percent, followed by another third of responses ranging from 21 to 45 percent. Therefore, those two ranges were used for the low and medium categories, respectively. Risks with an average probability of occurrence in excess of 45 percent were classified in the high probability category.

Based on the analysis described above, the survey results suggest qualitative probability rankings be defined as shown in Table 15.1.

Risk impacts were categorized with the process used for probability classifications. Figure 15.15 shows the number of responses and cumulative percentages of the bins used for determining the impact categories. One-third of the responses fell within the range of 0 to 15 percent, followed by another third of responses ranging from 16 to 35 percent. Therefore, those two ranges were used for the low and medium categories, respectively. Risks with an average impact in excess of 35 percent were classified in the high impact category.

Based on the analysis described earlier, the survey results suggest qualitative impact rankings be defined as shown in Table 15.2.

After developing the qualitative probability and impact categories, the authors used the average quantitative rating for each risk to find the qualitative probability and impact score, based on the categories presented in Tables 15.1 and 15.2. The authors used Figure 15.12 to find the overall risk rating.

ID	Risk item and description	Quantitative estimate of: Probability	Quantitative estimate of: Impact	Type of impact	Risk response strategy	Post-response quantitative estimate of: Probability	Post-response quantitative estimate of: Impact
		Please give your best estimate in rough percentage terms.		Cost, schedule, etc.	Please choose a few risks for which to provide a response strategy, and don't forget to enter the mitigated rankings in the cells to the right.	Please give your best estimate in rough percentage terms.	
1	Earthquakes or other natural disasters disrupt network connectivity or other telecommunications services.						
2	Inadequate planning causes delays in ground-breaking for telecommunications and digital projects the further north the project takes place.						
3	Post-development reclamation requirements increase operating costs.						
4	Technology support (hardware and software) is more difficult to provide to remote areas.						
5	Alaska's limited labor pool makes it difficult to staff a job with the proper number of required skill sets.						

FIGURE 15.13 Survey instrument for the second survey.

As an example of how the probability and impact categories may be determined by an organization, Table 15.3 shows definitions used by the Halliburton Company (Halliburton Company, 2006). Significance is represented as either the impact in the share price or the total impact on the company. Likelihood is reported as the frequency of occurrence within a set time interval.

15.6.2 Risk Register

The authors developed a basic risk register format based on the description found in *PMBOK Guide* (Project Management Institute, 2004, p. 249) and exposure to other alternative formats. The register includes the following headings for organizing, estimating, and responding to risks:

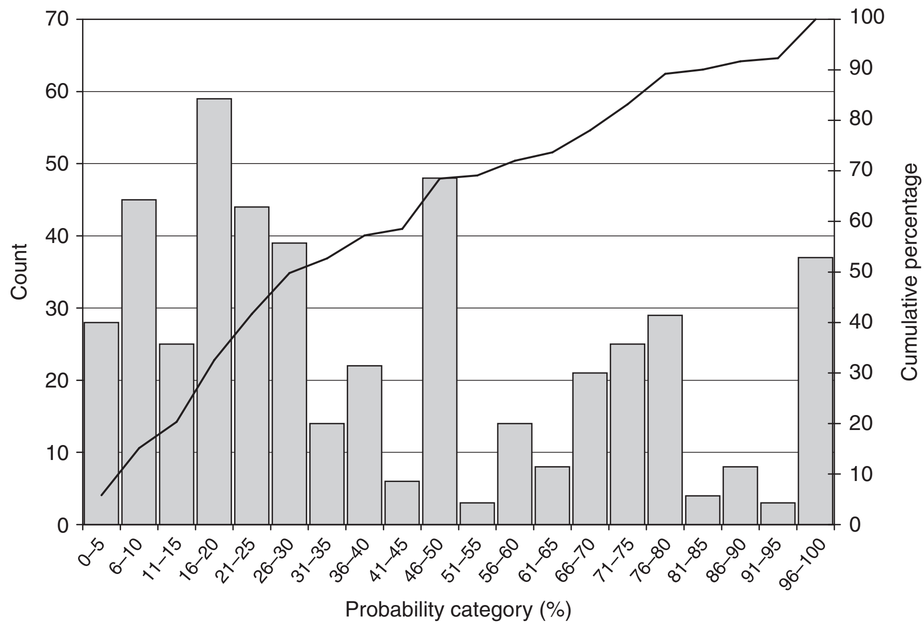

FIGURE 15.14 Count and cumulative percentage of probability bins.

- Risk category, including the first/second-level RBS category and positive/negative
- Risk item and description
- Qualitative ranking of probability and impact
- Risk response strategy
- Post-response qualitative ranking of probability and impact

The completed risk register is shown later in the chapter.

Based on an analysis of the qualitative rankings, the top risks for Alaska oil and gas capital projects are shown next. Each of the risks had a high probability of occurrence and a high impact.

Negative Risks—External

- Environmental regulations increase the cost and complexity to workers to the field, due to the avoidance of roadless and environmentally sensitive areas. Failure to plan for or address regulatory issues to be in full compliance could lead to fines and or schedule stoppages.

TABLE 15.1 Qualitative Probability Ranking Criteria

Probability of occurrence	Qualitative probability ranking
0–20	Low
21–45	Medium
46–100	High

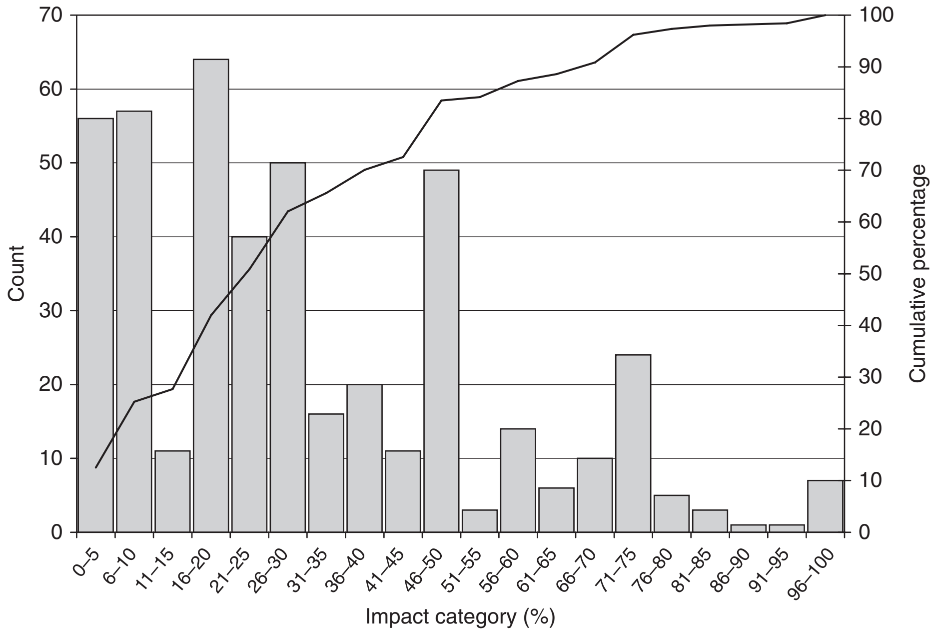

FIGURE 15.15 Count and cumulative percentage of impact bins.

- Harsh weather has a negative effect on productivity. Steady winds create substantially lower wind-chill temperatures. Some construction work cannot be completed in extreme temperatures.
- Unique suppliers increase the lead time required for procurement of certain items.
- Harsh conditions shorten the useful life of equipment. Extreme temperatures degrade equipment performance. Some equipment will not operate at temperature extremes.
- A lack of training and education about cultural differences creates misunderstandings and a lack of trust.

Negative Risks—Technical

- Use of insulation makes it more difficult to detect corrosion and leaks, requiring the use of more expensive detection technology.
- When revamping or tying into an existing system, the project team finds undocumented conditions impacting the cost and/or schedule.

TABLE 15.2 Qualitative Impact Ranking Criteria

Impact of occurrence (percent change from normal) (positive or negative)	Qualitative impact ranking
0–15	Low
16–35	Medium
36 and higher	High

TABLE 15.3 Risk Significance and Likelihood Categories (Halliburton Company, 2006)

Risk measurement	Level of impact				
Significance	Lowest		Medium		Highest
$ per share	0.01	0.01–0.10	0.10–0.25	0.25–1.00	> 1.00
Total impact (millions of $)	5	5–50	50–125	125–500	> 500
Likelihood	Extremely rare	Rare	Periodic	Recurrent	Frequent
Frequency of occurrence	< 1 in 20 years	1 in 10 years	Likely in 5 years	Almost certain in 2 years	>1 per year

- The small and remote market in Alaska limits the availability of commercially available options for telecommunications, increasing the price paid for these services.
- Remote areas lack access to current technologies and network connectivity or have slow or unstable connections. Network access has a high cost in these areas. Inadequate network bandwidth or high network latencies create challenges to communication and coordination.

Positive Risks—Technical

- Enhanced communications and rapid access to project data improves the oversight of projects. Increased connectivity provides opportunities for rural residents to feel more connected to major Alaska population centers.

15.7 RISK RESPONSE PLANNING

Risk response planning "is the process of developing options, and determining actions to enhance opportunities and reduce threats to the project's objectives" (Project Management Institute, 2004, p. 260). Risk response strategies are developed through the "process of developing options, and determining actions to enhance opportunities and reduce threats to the project's objectives" (Project Management Institute, 2004, p. 260). Multiple strategies can be developed for an individual risk, and some strategies may be effective in handling multiple risks that share the same general classification or root cause. After determining risk response strategies, it is important to evaluate the revised probability and impact of each risk, assuming that the response strategy has been applied. This chapter used the second survey to solicit potential risk responses.

15.7.1 Survey Methodology

The second survey solicited both risk response strategies for each risk item identified in the first survey and the post-response qualitative probability and impact rankings. Respondents were asked to provide risk responses and post-response quantitative rankings for three to five of the risks shown in the risk register spreadsheet. Since the risk response strategies are unique to each respondent, and group responses were not available to determine the average probability and impact rankings, the mitigated rankings were considered preliminary estimates only.

15.7.2 Survey Findings

The analysis of risk response strategies and the resulting probability and impact followed the general process outlined in the section on qualitative risk analysis. Before starting the analysis, the authors

TABLE 15.4 Risk Response Strategies for the Top Three Risks

Risk	Risk response strategies
Environmental regulations increase the cost and complexity of workers in the field, due to the avoidance of roadless and environmentally sensitive areas.	Negotiate permitting conditions with regulators for optimum working restrictions. Propose mitigation measures for impacted areas. Work with regulators to modify typical restrictions. Use proactive compliance and worker training to avoid potential impacts.
Enhanced communications and rapid access to project data improves the oversight of projects.	Accelerate projects and improve quality. Determine available means of communication and access them early in a project to take full advantage of the benefits.
Harsh weather has a negative effect on productivity.	Schedule outside work in warmer months. Build additional cost and schedule into the baseline estimate. Make an allowance in schedule and cost. Ensure all equipment is rated to low temperatures. Develop a spare parts list for additional cold weather failures. Have appropriate harsh weather clothing for workers. Supply appropriate break rooms. Provide recreational and social opportunities for workers to mitigate psychological impacts.

cleaned the data to omit blank responses, non-responsive comments, and comments unrelated to the intent of the survey. Since the qualitative probability and impact rankings were unique to the individual providing the response strategy, the rankings were left as is. A few response strategies were similar and were combined in the risk register, but in each case only one of them had an accompanying set of probability and impact rankings, so no averaging was necessary.

15.7.3 Risk Response Strategies

Table 15.4 provides the risk response strategies suggested by survey respondents to deal with each of the top three risks. Risk response strategies for the other risks are shown in the risk register later in the chapter.

15.8 RISK REGISTER

The following table presents a risk register for Alaska oil and gas capital projects.

		Ranking			Post-response ranking	
RBS categories	Risk item and description	P	I	Risk response strategies	P	I
Negative Risks—External						
Regulatory and Legal	Environmental regulations increase the cost and complexity of workers in the field, due to the avoidance of roadless and environmentally sensitive areas. Failure to plan for or address regulatory issues to be in full compliance could lead to fines and or schedule stoppages.	H	H	Negotiate permitting conditions with regulators for optimum working restrictions. Propose mitigation measures for impacted areas. Work with regulators to modify typical restrictions. Use proactive compliance and worker training to avoid potential impacts.	M	M

Continued

RBS categories	Risk item and description	Ranking P	Ranking I	Risk response strategies	Post-response ranking P	Post-response ranking I
				Ensure that regulatory requirements are known and understood and develop project plan activities to ensure that compliance is attained and sustained throughout and beyond the project life cycle. Probability of occurrence can be lowered, but if encountered could still yield a negative impact to cost and schedule.	M	M
Environment, Geography, and Geology	Harsh weather has a negative effect on productivity. Steady winds create substantially lower wind-chill temperatures. Some construction work cannot be completed in extreme temperatures.	H	H	Schedule outside work in warmer months or to avoid periods of extremes. Build additional cost and schedule into the baseline estimate. Plan for shelters to be built and warmed during periods of extreme cold.	H	M
				Have appropriate harsh weather clothing for workers. Supply appropriate break rooms. Ensure all equipment is rated to low temperatures. Develop a spare parts list for additional cold weather failures.	H	M
				Provide recreational and social opportunities for workers to mitigate psychological impacts.	H	M
				Compare the cost and schedule impacts of heating the material and/or environment to the impacts of performing work in more suitable temperatures. Pick the acceptable impact.	H	M
	Harsh conditions shorten the useful life of equipment. Extreme temperatures degrade equipment performance. Some equipment will not operate at temperature extremes.	H	H	Investigate the availability of equipment built to withstand harsh conditions and compare costs.	H	M
				Determine the equipment affected and schedule the use of those sensitive systems for periods outside extreme temperatures. Provide heating and indoor storage. Alternatively, change methods during periods of extreme temperatures.	H	L
				Anticipate extreme cold and build that expectation into estimates. Otherwise, wait it out, since usually these periods of extreme cold aren't too long.	H	L

Continued

		Ranking			Post-response ranking	
RBS categories	Risk item and description	P	I	Risk response strategies	P	I
Subcontractors and Suppliers	Unique suppliers can increase the lead time required for procurement of certain items.	H	H	Determine lead times early and place orders accordingly.	L	H
Social and Culture	Inadequate training and education about cultural differences creates misunderstandings and a lack of trust.	H	H	Train workers on this issue as part of a project's orientation training. Encourage or facilitate social interaction and opportunities for remote workers and rural residents to participate in joint activities and cultural exchange.	M	M
Environment, Geography, and Geology	Distance and travel requirements lead to above average subcontractor and supplier costs. Technology support (hardware and software) is more difficult to provide to remote areas.	H	M	Consolidate shipments to the greatest extent possible. Determine a work schedule resulting in lowest overall costs.	M	L
				Plan for higher delivery and labor costs. Work with contractors to develop a plan to minimize impacts such as having multiple contractors "car pool" to distant project sites.	M	M
				For technology, establish satellite-based, integrated, remote diagnostic capabilities.	M	M
				Estimate training costs for adequate local support. Estimate contingency costs based on historic issues and accounting. Establish adequate rates or plan rate increases to reflect additional service costs.	M	L
	Steady wind increases the dispersion of hazardous airborne discharges.	H	M	Provide filtering systems to reduce/eliminate harmful discharges.	M	M
	Dry snow drifts block roads and facilities much like sand. Snow accumulation and removal has a significant impact on both the cost and schedule of a project.	H	M	Ensure appropriate snow removal equipment is on site.	H	L
				Plan/identify additional resources. Estimate training costs for adequate local support. Estimate contingency costs based on historic issues and accounting. Factor snow removal into utility rate early in planning process.	H	L
				Investigate scheduling projects for snow-free months. If that is not possible, add costs and schedule extra time for snow delays.	M	M
	Harsh conditions require the use of additional and/or specialized insulation, increasing lead times and costs for affected materials.	H	M	Alaska weather history is well documented. Research conditions in engineering pre-planning phase. Perform a cost-benefit analysis on specialized insulation. Schedule insulation order as a critical path item in scheduling.	H	L

Continued

RBS categories	Risk item and description	Ranking P	Ranking I	Risk response strategies	Post-response ranking P	Post-response ranking I
	Global warming decreases the time during which ice roads can be used.	M	H	Develop project budget and schedule based on period of certain availability. Additional time, if available, would enhance performance.	M	M
	Sea water and ballast water corrode piping and other components, increasing the risk of system failure.	M	H	Build a 20% risk factor into the cost and schedule estimates. Anticipate that there will be "discoveries" when breaking into old or undocumented systems.	M	L
				Develop a proactive inspection/monitoring plan and methods that allow for early detection of corrosion.	M	L
	Ice pressure ridges form around offshore ice pads and can cause damage.	M	H	Investigate whether it is more economical to improve the ice pad barriers or to fix damage, and pick the lower cost option.	M	M
	Difficult to get supplies and equipment to remote sites for project work. Water transportation can reach the North Slope only one month per year. Cold weather, high pressure areas, and extended wind negatively affect access by airplanes.	M	H	Look for "work-around" opportunities. Ask for funding specific to the purchase of long-lead items and order those items ahead of other types of materials.	M	M
				Determine the most economic transportation method ahead of time and implement it.	L	M
Subcontractors and suppliers	Difficulty with subcontractor oversight leads to negative impacts to cost, schedule, and/or quality.	M	H	Establish a clear understanding of subcontractors' authority, responsibility, and communication protocol at the beginning and maintain it.	L	H
				Work closely with contractors to ensure scope is understood. Include penalties and benefits for late completion or early completion.	L	M
Political	Digital projects are placed at a much lower value/priority relative to construction projects because of a lack of political commitment and/or funding resulting from Alaskan cultural biases.	M	H	Develop well documented and clearly articulated business cases for digital projects that enable business leaders to evaluate the value and priority within the context of other non-digital related projects. Lobby for support.	L	H
Environment, Geography, and Geology	Lower than normal pressure of oil in ground requires pressurization for production, increasing the cost of development.	M	M			
	Geographical dispersion presents challenges and risks in managing stakeholder interest and requirements when working on enterprise-wide digital projects, resulting in schedule delays and	M	M	Identify appropriate training as mandatory for local labor employment. Institute training applicable to an initial and periodic training regime for remote stakeholder employees.	L	M

Continued

		Ranking			Post-response ranking	
RBS categories	Risk item and description	P	I	Risk response strategies	P	I
	added cost. Stakeholders residing in remote areas receive inadequate training.			Proper planning and stakeholder engagement can mitigate local training issues. Conduct a thorough stakeholder analysis and ensure that the project communications plan accounts for stakeholder interest throughout the enterprise. Schedule stakeholder meetings. Provide thorough notices. Follow through on schedule for due diligence in the stakeholder communications program.	L	L
				Provide satellite-based video conferencing capabilities and training.	M	L
	Remoteness presents challenges and risks in acquiring specialized skills (such as application integration architecture and proprietary commercial off-the-shelf software solutions) to support digital project activities.	M	M	Digital projects that have known specialized resource requirements should begin early in evaluating procurement options to ensure that competitive rates can be secured for these unique skills.	M	L
				Hire trainers and provide training to develop an adequate internal knowledge base.	L	M
	High travel costs result in a technical workforce with inadequate training in the latest technologies and best practices.	M	M	Determine cost savings through a well-trained work force and compare to the cost of training. Pick the higher of the two.	L	L
				Form alliances with competitors for training from the Lower 48.	L	M
				Pay premium wages and salaries to workers with the necessary skills and knowledge.	L	M
	Snow drifts increase the risk of vehicles hitting pipes or external components of facilities.	M	M	Place flags, stakes, and protective works around the facilities.	L	M
	Breakup or permafrost melt affects installed hardware. Earthquakes or other natural disasters disrupt network connectivity or other telecommunications services.	M	M	Investigate the susceptibility of installed items and either replace them with more durable hardware or protect from them from freeze/thaw cycle impacts.	L	L
				Develop plan for earthquake damage mitigation.	M	L
				Increase engineering design controls at critical areas as protection measures. Review contingency repair budget for most vulnerable locations. Review emergency response plan for this hazard.	L	M
				Prepare emergency communication plan. Have satellite communication capability with network tie-in.	M	L

Continued

RBS categories	Risk item and description	Ranking P	Ranking I	Risk response strategies	Post-response ranking P	Post-response ranking I
				Provide redundant, multipath network connectivity.	M	L
Political	High inventory taxation by the local government, limited storage area, and high storage costs discourage storage of extra materials, leading to schedule delays when deliveries are late.	M	M	Develop a list of critical items and use a cost-benefit analysis to determine appropriate inventory levels for each.	L	M
				Implement an automated inventory management and fulfillment system linked to more reliable suppliers.	L	M
Environment, Geography, and Geology	Alaska's central location makes it susceptible to disease vectors from other areas of the world. Close living quarters increase potential for transmission of communicable diseases.	L	H	Enforce hand washing after and before any activity involving close personal contact or contact with food.	L	L
				Require workers to report to a health clinic immediately upon noticing signs of illness so that steps can be taken to minimize the threat of disease transmission.	L	M
				Install filtration systems to minimize the presence of airborne germs.	L	M
	Forming or melting ice has a detrimental impact to oil spill prevention. During this time, it is difficult to deal with blowouts.	L	H	Assess the likelihood of a blowout during such times and provide for adequate means to clean up. Model scenarios and research spill control on the front end of the process through better engineering or more frequent maintenance and monitoring procedures. Utilize containment designs.	L	M
Negative Risks—Technical						
Technology	Use of insulation makes it more difficult to detect corrosion and leaks, requiring the use of more expensive detection technology.	H	H	Evaluate the cost and availability of insulation technologies that aid in the use of the detection technology.	M	M
				Stay on the cutting edge of non-destructive examination and detection equipment. Maintenance saves time and money, which pays for itself in the long run.	M	H
	When revamping or tying into an existing system, the project team finds conditions that were not documented in the "as builds" that have impacts on the cost and/or schedule.	H	H	Build into the cost and schedule estimates a 20% risk factor. Anticipate that there will be "discoveries" when breaking into old or undocumented systems.	H	M
				If work on existing installations is required, allow more time for engineering/design to avoid "surprises" during construction.	H	M
				Require the creation of "as-builts" in all new work contracts.	M	M

Continued

RBS categories	Risk item and description	Ranking P	Ranking I	Risk response strategies	Post-response ranking P	Post-response ranking I
Technology	The small and remote market in Alaska limits the availability of commercially available options for telecommunications, increasing the price paid for these services.	H	H	Model costs to distribute them among regional users, both commercial and residential. Adjust rates for service utility costs for larger users.	H	M
				Allow longer lead times to identify and implement the available options to meet the telecommunication needs on a given project.	H	L
				Rationalize costs against productivity and quality improvements. Work with Telcos to create a new technology "test bed" that has extensibility to other similar locations.	M	M
	Remote areas lack access to current technologies and network connectivity or have slow or unstable connections. Network access has a high cost in these areas. Inadequate network bandwidth or high network latencies create challenges to communication and coordination.	H	H	Rationalize costs against productivity and quality improvements.	M	H
				Implement satellite communication systems.	M	H
	Different site conditions and development over time lead to a lack of standards in technologies and techniques used.	H	M	If work on existing installations is required, allow more time for engineering/design to avoid "surprises" during construction.	H	L
Health and Safety	Steady winds create substantially lower wind-chill temperatures.	H	M	Attempt to schedule work to minimize exposure during periods of steady wind.	H	L
Technology	Skilled engineers and designers brought in from outside the state aren't familiar with arctic conditions, leading to design problems and rework.	M	H	Develop Work Breakdown Structure (WBS) chart detailed enough to identify special skill sets required. Resource load the project. Put call in for needed skill sets.	L	H
				Require engineers to take an arctic engineering course and/or work under an experienced arctic engineer or engineer experienced with the arctic.	L	H
				Give detailed specifications to engineers and designers. Train and hire earlier in the project to get them up to speed on the specifications so that the learning curve will not affect the schedule.	L	H
				Promote an Alaska university program curriculum to develop local engineering skills.	L	H
				Provide bonuses to workers that complete projects and have tenure.	M	M

Continued

RBS categories	Risk item and description	Ranking P	Ranking I	Risk response strategies	Post-response ranking P	Post-response ranking I
				Provide educational scholarships for rural residents.	L	H
	Some equipment will not operate at temperature extremes.	M	M	Anticipate extreme cold and build that expectation into estimates. Otherwise, wait it out, since usually these periods of extreme cold don't last too long.	M	L
				Determine the equipment affected, chart out the temperature limits, and try to schedule work requiring use of that equipment outside periods of extreme temperature conditions. Alternatively, change methods during periods of extreme temperatures.	L	M
Complexity and Interfaces	Post-development reclamation requirements increase operating costs.	M	M	Define all requirements prior to completion and implement remedies.	L	M
				Explore engineering design controls at critical areas as protection measures to reduce potential reclamation work.	L	L
Negative Risks—Project Management						
Planning	Inadequate planning causes delays in ground-breaking for telecommunications and digital projects the further north the project takes place.	M	H	More forward the planning of resources. Have all managers review the procurement plan/schedule earlier in the planning process. Review critical path items with high potential for delays.	L	H
Controlling	A lack of oversight of remote systems leads to information assurance and data security issues.	M	M			
Negative Risks—Organizational						
Resources and Labor	Remote camp conditions create a loss of family life for workers and increase turnover.	H	M	Provide real-time video based communication. Provide workers with PCs and webcams.	M	L
				Require workers to rotate on a regular basis. Provide good communication tools for family contact.	M	L
				Determine the optimum number of working hours per day and days per rotation period. Provide higher pay and other compensation, possibly tied to length of service.	M	L
				Add contingency to camp estimates to assure adequate beds for workers.	H	L

Continued

RBS categories	Risk item and description	Ranking P	Ranking I	Risk response strategies	Post-response ranking P	Post-response ranking I
	Alaska's limited labor pool makes it difficult to staff a job with the proper number of required skill sets. Insufficient technical expertise is available locally to support digital projects.	M	H	For technical needs, establish satellite-based, integrated, remote diagnostic capabilities.	L	M
				Develop WBS chart detailed enough to identify special skill sets required. Resource load the project. Put call in for needed skill sets.	L	H
				Identify critical labor roles for limited recruitment efforts. Explore automation of routine tasks.	L	H
				Investigate grouping or combining of small projects to attract more bidders.	L	M
				Raise the wage scale to attract talent.	L	H
				Recruit workers outside of Alaska. Provide scholarships for Alaska students to attend top schools outside. Recruit for engineering and vocational talent on global basis in northern countries (e.g. Scandinavia, Russia, China, etc.).	M	M
				Develop a staffing plan. Start staffing earlier than a Lower 48 project. Go the Lower 48.	M	M
	Alaska's small labor pool causes delays when waiting to get someone certified for a specific type of work, such as a certified welder, and decreases the competition for certain types of work, leading to cost, quality, and schedule issues.	M	M	Develop a WBS detailed enough to identify special skill sets required. Resource load the project. Put a call in for needed skill sets that reflect Gantt chart needs.	L	M
				Develop schedule for worker certification and hiring that accounts for time delays.	L	M
				Establish dedicated training and certification programs. Cost offset by increased productivity, quality, and reduced schedule.	L	M
				Pull workers out of the Lower 48 labor pool.	M	L
				Investigate grouping or combining of small projects to attract more bidders.	L	L
	Remote camp conditions lead to greater turnover in the labor force.	M	M	Add contingency to camp estimates to assure adequate beds for workers.	L	M
				Determine the optimum number of working hours per day and days per rotation period.	L	M
				Provide accelerating incentives tied to the length of service.	L	M
				Provide more comforts in camp: better communication to families, entertainment, better rotation schedules, etc.	L	L

Continued

RBS categories	Risk item and description	Ranking P	Ranking I	Risk response strategies	Post-response ranking P	Post-response ranking I
	Older engineers are retiring, leading to schedule delays from less experienced, younger engineers.	M	M	Develop a mentoring program and a lessons learned program.	M	L
				Plan for transitions and working "side by side."	M	L
				Provide incentives for near-retirement workers to convert to trainers.	M	L
	Stakeholders residing in remote areas receive inadequate training.	M	M	Identify appropriate training as mandatory for local labor employment. Institute training applicable to an initial and periodic training regime for remote stakeholder employees. Provide compulsory training via satellite feed.	L	L
				Proper planning and stakeholder engagement can mitigate local training issues.	M	L
Positive Risks—External						
Environment, Geography, and Geology	Ice roads provide access to environmentally sensitive areas in the winter. Ice roads used in the winter provide a smoother surface than gravel roads.	H	M	Schedule transport of equipment over ice roads, if it is more cost effective than other environmentally acceptable means.	H	H
				Plan critical transports for the period ice roads are in operation.	H	H
	Alaska is in a central location for global transportation, which makes it good for air freight.	H	M	Plan to maximize use of freight carriers through Anchorage.	H	M
	Higher than normal pressure of oil in ground increases the flow rate, reducing development costs.	M	H			
Regulatory and Legal	Environmental regulations provide benefits to the environment.	M	H			
Environment, Geography, and Geology	Remote camp conditions increase working hours and can accelerate schedules.	M	M	Determine the optimum number of working hours per day and days per rotation period.	M	H
				Provide extra incentives for increased quality and milestone acceleration. Cost offset by schedule improvements.	M	H
	Low temperatures increase the efficiency of some types of equipment.	M	M	Plan on using this type of equipment during cold weather periods.	M	H
	Spill cleanup is easier on solid ice.	M	M			
	Abundance of on-site gravel reduces construction costs.	L	M	Work overtime in the summer to stockpile gravel resources and protect them from freezing so that they can be used in the winter.	L	H

Continued

RBS categories	Risk item and description	Ranking P	Ranking I	Risk response strategies	Post-response ranking P	Post-response ranking I
Positive Risks—Technical						
	Enhanced communications and rapid access to project data improves the oversight of projects. Increased connectivity provides opportunities for rural residents to feel more connected to major Alaska population centers.	H	H	Accelerate projects and improve quality.	H	
				Determine available means of communication and access them early in a project to take full advantage of the benefits.	H	H
	Multiple communication options reduce the need for extensive travel, simplify logistical planning, and reduce costs.	M	M	Establish a communications protocol, taking advantage of all available means.	H	M
				Implement tools that can reduce costs and increase the effectiveness of project management activities.	M	H
	Deployment of digital services in support of rural projects provides additional job opportunities and economic growth in those areas.	M	M			
Positive Risks—Organizational						
Resources and Labor	Cutting-edge and challenging digital projects attract skilled IT workers to Alaska who wish to leave large metropolitan areas for what they consider to be a better standard of living.	L	L	Establish aggressive recruiting practices on a global basis.	M	L
Positive Risks—Project Management						
Communication	Increased opportunities for communication between project leaders and decision-makers improve relations with rural residents.	M	M	Establish links between remote workers and rural residents for joint activities and cultural exchange.	H	M

15.9 CONCLUSION

This chapter followed four of the *PMBOK Guide*'s six project risk management processes and aggregated risk items, categories, rankings, response strategies, and post-response rankings that are generally applicable to capital projects conducted by the Alaska oil and gas industry. The risk breakdown structure and risk register created through the process compliment each other and can be used by project managers to improve the management of risks in their projects.

The RBS and risk register developed here represent extensive experience and knowledge about the Alaska oil and gas industry and the challenges faced by its projects. They are intended for use as a means of increasing the local project risk management knowledge base by allowing an organization or project manager to benefit from others' experiences. Overall, the authors believe their effort has been successful in generating these tools.

The survey and interview findings support the original assertion that risks unique to Alaska oil and gas projects are primarily due to external and technical factors. The surveys and interviews identified a substantial number of risks within these categories. More importantly, the surveys provide some valuable strategies for managing those risks.

15.9.1 Suggestions for Future Work

This chapter has focused on the development of a RBS and risk register for risks unique to Alaska oil and gas capital projects. Throughout this chapter, the authors have attempted to provide a starting point for additional research about risks in Alaska projects.

The RBS reflects the nature of Alaska-specific risks, with the greatest level of detail given for external and technical factors. Future work could elaborate on the categories of organizational and project management risk.

The risk register is a first attempt at cataloging Alaska-specific oil and gas project risks. Future work could focus on expanding the risk register to reflect a broader variety of risks, more detailed analysis, and additional risk response strategies.

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PROJECT MANAGEMENT ORGANIZATIONAL FUNCTIONS

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CHAPTER 16
LEGAL CONSIDERATIONS IN MANAGING A NUCLEAR PLANT DECOMMISSIONING

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16.1 INTRODUCTION

When large, complex projects go awry, the consequences are often calamitous for cost, schedule, and quality objectives. Given the stakes in such projects, an injured party will invariably seek to identify likely culprits—typically those with the deepest pockets—and summon the lawyers to apportion blame. Litigation ensues but usually provides no more than a Pyrrhic victory, where even the nominal winners incur crippling losses.

Nevertheless, these spectacular train wrecks can provide useful insights into the legal pitfalls that project managers can and should avoid. By dissecting the eight-year decommissioning of the Connecticut Yankee nuclear power plant in Haddam Neck, Connecticut, and identifying how significant aspects of that project went wrong, managers can head off similar outcomes in their projects. Despite a fixed-price contract offering the seductive prospect of almost airtight protection from the kind of cost and schedule overruns that had plagued nuclear plant construction, the final cost to dismantle and dispose of the detritus from plant operations will be about \$840 million—double the projections—and completion will be nearly three years late. As would be expected, this project spawned extensive litigation, and the record compiled during the course of those disputes offers a window into decision making that highlights the value of the project management verities: planning, organization, and control.

Historically, nuclear construction projects have often been the bane of their managers' careers. The 1970s and 1980s were replete with the wreckage of nuclear projects that failed to meet reasonable expectations. Based on U.S. Department of Energy data, 75 commercial nuclear power plants completed between 1972 and 1986 averaged 1690 days of delay, and their constant-dollar costs increased by an average of 317 percent.[1] In response to these wildly escalating costs, economic regulators frequently judged the nuclear plant's utility owners "imprudent" and disallowed rate recovery for significant costs. For example, (1) the New York Public Service Commission disallowed \$1.395 billion in Shoreham Nuclear Project costs due to unreasonable management and about \$2 billion in the costs of the Nine Mile Point 2 nuclear project; (2) the Missouri Public Service Commission excluded \$384 million for imprudent management in constructing the Callaway

Nuclear Plant; (3) the Iowa State Commerce Commission denied recovery of $286 million of the costs for the same plant; (4) the Michigan Public Service Commission rejected $397 million in costs for the Fermi 2 nuclear plant; (5) the Kansas State Corporation Commission denied recovery for $244 million of the costs for the Wolf Creek Nuclear Generating Facility; (6) the New Jersey Board of Public Utilities reduced the Hope Creek nuclear plant's rate base by $432 million; (7) the Illinois Commerce Commission disallowed $101 million of the Byron 1 Nuclear Plant's costs; and (8) the California Public Utilities Commission refused to permit recovery of $330 million in plant costs for the San Onofre-2 and -3 nuclear plants.

Although empirical studies have shown that these cost disallowances "were largely driven by the desire to punish poorly managed utilities,"[2] some blame for such seemingly out-of-control projects also rightly fell on the regulatory regime that evolved rapidly after the Three Mile Island accident in 1979. The Nuclear Regulatory Commission (NRC) required many plants to redesign or retrofit entire systems, precipitating delays and increasing costs. Even in that volatile environment, however, some project managers proved that the nuclear plant construction beast could be tamed. Most notably, William Derickson was named the *Engineering News Record's* 1984 Man of the Year for delivering the St. Lucie 2 nuclear plant in only six years—half of the norm at the time. The premium for successful nuclear managers seemed to be an ability to control and adapt to change.

Nevertheless, apprehension about costs and safety—exacerbated by uncertainty following the Chernobyl accident in 1986—essentially shut down all new nuclear plant construction in the United States for two decades. Higher fuel prices and concerns about greenhouse gas emissions, however, have brought nuclear plants back into vogue, and the United States now seems poised to embark on a new round of construction that will be facilitated by the federal government's limited protections against cost overruns. The planned new plants hope to take advantage of lessons learned during the first era by streamlining and freezing regulatory requirements and using a few standardized designs. Even with these salutary precautions in place, it would be wise to consider more recent experience in "deconstructing" nuclear plants before embarking on this expensive new venture.

While nuclear power plant decommissioning has largely avoided the regulatory problems that the same plants encountered when they were built, several plants have experienced comparable delays and cost increases as they dismantle the facilities and decontaminate the site. In many respects, the decommissioning experience in the last decade parallels the upcoming restart of U.S. nuclear plant construction. As the first old plants shut down, there was little experience in dismantling highly radioactive structures and disposing of the hazardous wastes. Even the regulators were feeling their way. Similarly, after a long hiatus since the last plants were completed, the pool of experienced labor and managers to build sophisticated nuclear plants will be thin, and a new generation of regulators will be faced with exotic designs that have not yet been field tested. Thus, it would be prudent to consider the legal hazards that ensnared decommissioning managers and that await unsuspecting new plant construction managers. The Connecticut Yankee decommissioning experience offers a microcosm of what may be expected when the multibillion dollar new plants break ground.

16.2 BACKGROUND ON CONNECTICUT YANKEE

Connecticut Yankee, a 583 megawatt pressurized water reactor that went into service in 1968, had experienced more than its share of troubles when if finally shut down permanently in 1996 with ten years remaining on its NRC license. Although Connecticut Yankee did its primary job—providing more than 110 billion kilowatt-hours of electricity—it may have paid a dear price for that achievement. Regulatory investigations during its final years led to growing concerns about the plant's management and operation, including identification of significant deficiencies in engineering calculations and analyses relied upon to ensure the design adequacy of key safety systems. The straw that broke the camel's back was a nitrogen gas leak into the reactor vessel that displaced coolant but went undetected over the Labor Day weekend in 1996. Facing the prospect of enormous costs to satisfy NRC demands for dramatic improvements and a growing crisis of confidence in management's ability, Connecticut Yankee chose to cease operations and decommission the plant. An administrative judge found that there was a "pattern of mismanagement and unreasonable operation," and "the Company can be said to have contributed to the plant's own demise by dint of its imprudent management and operation of the plant in recent years."[3]

As it began planning for decommissioning, the legacy of slipshod plant operations began to become even more apparent. Initial radiological surveys found contamination far afield from the confined plant area, including in a landfill more than a mile from the plant. Lax controls during plant operations had even permitted employees to remove "free" concrete blocks and fill dirt that had been contaminated through sloppy cleanup activities and a history of leaking pipes and tanks. The contaminated blocks ended up in retaining walls and basements, and some of the fill dirt even found its way to a day care center, raising an understandable community furor, damaging Connecticut Yankee's credibility, and leading Connecticut's Attorney General to declare that "the goal is no longer to decommission a nuclear power plant, but rather to decontaminate a nuclear waste dump."[4]

The history of leaks and spills at the site created the greatest concern for decommissioning, which would require locating, removing, and disposing of all remnants of that contamination. An administrative judge found a "demonstrated poor and careless handling of radiological materials" that had been exacerbated by multiple nuclear fuel failures.[5] Consequently, dangerous materials like Strontium 90—a hard-to-detect radionuclide that can be fatal if ingested—had likely gone into the soil where they could be dispersed by ground water. While the scope of the contamination and its onsite extent was not known when decommissioning began, no one could overlook its significance for the upcoming project.

During the early days of decommissioning planning, Connecticut Yankee had already strained relations with both its safety and economic regulators. The NRC had shutdown all quality-related operations until Connecticut Yankee proved that it could conduct them safely. Given past performance failures, both the state public utility commission and the Federal Energy Regulatory Commission were skeptical of the company's ability to plan and execute decommissioning prudently and efficiently. Partly in an effort to restore confidence, Connecticut Yankee brought in an entirely new management team, many of whom had worked on decommissioning at a much smaller Connecticut Yankee sister plant. Thus, Connecticut Yankee attempted to begin decommissioning on a new footing that would permit it to overcome its past lapses.

16.3 PROJECT CHARACTERISTICS AND LEGAL FRAMEWORK

Like most major projects, the Connecticut Yankee decommissioning was shaped by its legal environment, and its managers had to be aware of those very real constraints. Every significant project operates within a regulatory context that imposes external conditions and creates a degree of uncertainty that managers cannot fully control. Nevertheless, by understanding the legal setting and reacting to it reasonably, managers can blunt its impact.

16.3.1 Economic Regulation

The first constraint on Connecticut Yankee was economic. As a single-asset operating public utility, Connecticut Yankee was entitled to recover all of its operating and maintenance costs, plus a return of its capital investment and a reasonable return on that investment. Ultimately, customers who bought the plant's electricity paid for the plant and gave its owners a fixed profit. Because the decommissioning obligation was always known and would be a substantial expense, Connecticut Yankee also collected money through rates set aside in a fund to cover those expected costs. The hope was that when the plant shut down at the end of its operating license, ratepayer contributions to the fund, plus investment income, would be enough to cover decommissioning costs.

When the plant shut down 10 years before the end of its license, however, the fund was clearly inadequate to complete decommissioning. Under the regulatory scheme, Connecticut Yankee was permitted to continue collecting for decommissioning through rates, even though it was no longer producing power. Of course it no longer had a capital investment on which it could earn a return, so, in effect, Connecticut Yankee simply passed all decommissioning costs on to New England's electric ratepayers. Connecticut Yankee had no direct financial interest in the amount of decommissioning costs because it expected to be reimbursed fully for all those costs.

The only exception to full reimbursement would be if Connecticut Yankee acted "imprudently." Despite the history of rate base reductions for nuclear plant construction, the prudence standard is generally quite forgiving, and only management that is deemed unreasonable under the circumstances will be penalized by a disallowance that would require the company to pay for decommissioning instead of its ratepayers. Although the prudence test is difficult to prove or enforce, it does act as a restraint on utility managers, and they can be held accountable for their decisions after the fact if they stray too far from normative performance.

16.3.2 Safety Regulations

The second legal duty flows from Connecticut Yankee's role as licensee for the Haddam Neck nuclear power station. Since the Atomic Energy Act of 1954, the federal government has regulated the construction, operation, and decommissioning of commercial nuclear power plants, first through the Atomic Energy Commission and later through the NRC. Current NRC regulations specify exacting standards for dismantling and removing radioactive wastes from the site to return it to a state comparable to normal background levels of radiation. In general, the licensee must remove radiation from the power plant site so that a hypothetical person living at the site will receive less than 25 millirems of radiation per year, including the dose that would be received from ingesting groundwater or air and from direct exposure. In addition, states like Connecticut impose their own radiation standards and require reducing the dose to only 19 millirems per year before the site can be released for other uses.

Federal and state regulations also limit the amount of radiation workers can receive over the entire decommissioning project. If the licensee exceeds those limits, it jeopardizes its ability to fall within the prescribed environmental impact statement and may trigger a substantial additional effort to justify the decommissioning, almost certainly causing a significant delay and cost increase. The NRC imposes strict rules for monitoring workers' exposure, and even if the numerical limits are met, requires the licensee to plan work tasks in order to push the dose levels "as low as reasonably achievable" or ALARA.

The licensee may not delegate its nuclear safety responsibilities. While contractors or consultants may assist in preparing and implementing safety procedures, the NRC looks solely to the licensee for performance. Because of the enormous risks inherent in decontaminating a nuclear plant, the NRC and generally accepted nuclear industry practice require strict adherence to safety codes.

16.3.3 Managers' Experience

The third constraint on Connecticut Yankee as it began decommissioning was based on an objective assessment of its own capabilities. Its managers had typically developed their skills at an operating utility, where steady-state performance was the rule. They were not well equipped to undertake the very different activities associated with the decommissioning project and were unaccustomed to the temporary nature of projects or to the demands for flexibility and immediate decisions in response to constantly evolving circumstances. Moreover, most of Connecticut Yankee's managers had not been responsible for planning, directing, and overseeing major contractors' work to ensure performance to meet objectives. Most of the existing managers who may have performed well in operations and were valuable assets to recall and document plant history were ill prepared for the challenges of an intense project to deconstruct the plant.

To address its lack of experienced decommissioning managers, Connecticut Yankee could follow one of two routes, each with significantly different implications for the project's legal framework. First, Connecticut Yankee could hire its own managers with the requisite backgrounds to direct decommissioning. At that time, however, no large commercial nuclear power plant had been fully decommissioned, and most experienced managers were already working at one of the other plants undergoing decommissioning. Connecticut Yankee had transferred several senior managers from a sister company in Massachusetts that was decommissioning a smaller plant, but their experience was limited, and Connecticut Yankee was unlikely to be able to acquire other managers with the requisite skill sets.

Alternatively, Connecticut Yankee could engage an experienced contractor that could plan, organize, and manage the work under Connecticut Yankee's direction. The contractor—known as the Decommissioning Operations Contractor or DOC—would have broad responsibility for meeting specified objectives such as NRC license termination or workers' radiation dose levels within limits. This approach could provide Connecticut Yankee with the talent it needed for the project, but it raised other potential concerns. Because Connecticut Yankee was a regulated utility and NRC licensee, it had nondelegable duties that it would still have to maintain. Furthermore, as the owner, Connecticut Yankee could not simply turn this important project over to a contractor whose economic interests could never be fully aligned with the owner. Thus, even if it contracted for managers to perform the work, Connecticut Yankee still had to have managers who could oversee the contractor effectively.

16.3.4 Connecticut Yankee's History

Connecticut Yankee's contamination record hung over the decommissioning project and created extraordinary uncertainty. One of the "known unknowns" as Connecticut Yankee planned for decommissioning was the extent of radioactive contamination both inside and outside the plant area. Several factors in the plant's operating history indicated that this would be a crucial issue. At least three major fuel failures—where the cladding came off the fuel, permitting pieces of nuclear fuel to enter the plant's cooling system—meant that parts of the plant that would ordinarily be considered "clean" were now suspect. Moreover, repeated leaks from that same cooling system created a likelihood that contamination reached the soil under and around plant buildings. The failure to maintain comprehensive records on leaks and remediation activities meant that Connecticut Yankee was largely in the dark about the location and extent of contaminants. Lax controls that had permitted contaminated materials to be taken well off site created further uncertainty about what they might find in a comprehensive site survey that included soil and groundwater testing.

This level of uncertainty had two significant implications for the decommissioning project's legal framework. First, Connecticut Yankee could not reasonably expect that any DOC would accept financial responsibility for the undefined scope of work related to contamination in normally clean plant systems or outside the radiologically controlled area. A contractor would be foolhardy to assume the risks for work that could not be adequately delineated without substantial testing. Second, safety regulators would be skeptical of any glib assurances that Connecticut Yankee had bounded the extent of contamination. Given Connecticut Yankee's checkered history, it would have to take exceptional steps to convince regulators that contaminants had been located and removed.

In fact, Connecticut Yankee was on notice that its performance in addressing contamination issues could make or break the decommissioning project. As early as 1996, an employee warned Connecticut Yankee that its history of failed fuel, known cooling water leaks into the soil, and the topography of the site meant that Strontium 90 could be in the groundwater where it could migrate through the site. He urged the company to "do the right thing" and to undertake necessary testing and soil removal. Unfortunately, Connecticut Yankee's new decommissioning managers did not timely heed those warnings.

16.3.5 Contracting Approaches

In 1997, before undertaking any significant decommissioning work, Connecticut Yankee wisely commissioned an independent assessment of contract strategies. This analysis of experience in managing similar nuclear projects identified two major approaches: (1) a comprehensive "turnkey" or "design/build" contract with a single DOC responsible for the entire scope of work; and (2) a "conventional" approach in which the owner creates its own project management team that contracts for particular elements of the work scope. Under either approach, the work could be contracted on a fixed-price or cost-plus basis.

Connecticut Yankee's choice of a contracting strategy was pivotal. Under a turnkey contract, the DOC would be in control, and the owner would have a limited ability to influence the contractor's processes and approaches. Nevertheless, the owner could not relinquish control over key project elements, including the quality of the work, protection of worker safety, interface with the NRC, and compliance with schedule objectives. This contracting plan required an extensive up-front effort to define the work scope and characterize the condition of the plant—preconditions that were difficult to satisfy in this case. Finally, as Connecticut Yankee would learn, it would be difficult to remove a nonperforming DOC because its work scope extended the full breadth of the project.

Alternatively, Connecticut Yankee could manage the project with its own forces, but this would require a larger, more experienced staff with very different skills from the company's operating managers and engineers. Because it did not have a project focus during the plant's operation, Connecticut Yankee might take longer to complete the work because it would not be able to contract for work as efficiently. Nevertheless, if the project was not fully defined, the conventional approach could provide the best opportunity to control project cost and schedule.

16.3.6 Anticipate Change

Regardless of the contracting approach, Connecticut Yankee's management had to prepare for a significant degree of volatility. There was not yet enough experience with decommissioning commercial nuclear power plants that the process had become routine. On the contrary, many of the work elements, for example, segmentation of the highly radioactive reactor vessel internals, fabrication of the concrete and steel casks that would store the spent nuclear fuel on site, and demolition of the 4.5 foot-thick containment building walls and dome were quite novel. Connecticut Yankee had to expect that the work would not transpire exactly as predicted.

Furthermore, given the dearth of hard information, contamination surprises were inevitable. Connecticut Yankee had not conducted tests to track the migration of contaminants through the groundwater and had not even begun to screen for the almost inevitable presence of hard-to-detect radionuclides. Because relatively small changes in the amount and type of contaminants could greatly impact whether Connecticut Yankee could meet applicable license termination criteria, a discovery in the middle of decommissioning could have a dramatic impact on schedule and costs.

Under these circumstances, change, adaptability, and flexibility should be the project manager's watchwords. By plodding resolutely along a familiar path when events dictate blazing a new trail, a manager could easily lose sight of the primary project objectives. An approach that appeared to be unassailable at one stage of the project may later become a significant impediment. Above all else, project managers would need to reassess their means and methods in light of the real conditions on—and under—the ground.

16.4 CONNECTICUT YANKEE'S REACTION TO ITS LEGAL FRAMEWORK

16.4.1 Response to Regulatory Framework

In response to questions that regulators raised about the reasonableness of projected decommissioning costs, Connecticut Yankee entered a fixed-price, turnkey contract with Bechtel Power Corporation for DOC services. This approach was expected to yield numerous advantages. First, by soliciting bids from prospective turnkey contractors, Connecticut Yankee anticipated achieving the lowest competitive cost. Its key bidders were all experienced nuclear contractors that ought to perform well at reasonable costs, and Bechtel's bid was lowest by a significant margin. Indeed, some hypothesize that this bid may have been perilously low because Bechtel expected to use Connecticut Yankee as a "loss leader" for what it then anticipated would be a burgeoning market for decommissioning retiring nuclear plants. Second, the fixed-price contract could shield Connecticut Yankee from criticism—and possibly liability—for cost overruns. By shifting the risk of additional costs to Bechtel, Connecticut Yankee hoped it could limit its oversight responsibility and rely on the penalty provisions in the contract to assure schedule and quality performance. Third, Connecticut Yankee would not have to augment its staff with so many experienced decommissioning managers but would rely on Bechtel to contribute its considerable expertise.

This choice, while undoubtedly reasonable at the time, carried implications that Connecticut Yankee may not have appreciated fully. For instance, the fixed-price, turnkey contract did not relieve Connecticut Yankee of cost control responsibility to the extent that it may have anticipated. No contractor can be expected to absorb substantial losses on an ill-advised contract without looking for ways to escape the contract entirely or at least to recover its losses. Thus, no fixed-price contract can be so airtight that it will protect the owner fully from overruns. Nor will financial penalties be an absolute remedy for schedule or quality performance failures. When the penalties max out or exceed any realistic level that the contractor can accept, they become almost irrelevant and cannot be effective motivators. In fact, when continued performance is almost certain to be a losing proposition, a contractor may simply cut its losses by abandoning the project or at least reassigning its best resources to projects where they can be more profitable. Regrettably, a rigid, legalistic enforcement of a fixed-price contract on a failed project is unlikely to produce a satisfactory outcome for anyone, and the owner will always retain responsibility for escalating costs that are greater than the contractor is willing to absorb.

A fixed-price, turnkey contract may also be ineffective in shielding the owner from its regulatory obligations. Especially in the highly regulated nuclear arena, the NRC will continue to look to the licensee for performance, and too much reliance on a contractor intermediary can be risky. Ambiguity in the contract's assignment of duties can permit some tasks to fall between the cracks, thereby jeopardizing critical schedule milestones and damaging credibility with the regulator. Moreover, because the licensee retains responsibility for worker safety, it must remain involved in some work methods decisions, thus potentially intruding on the DOC's rights to perform the work as it sees fit. These clashes are almost inevitable when the owner chooses a fixed-price turnkey contract approach.

16.4.2. Dividing Responsibility Between Owner and Contractor

As with any project, but more importantly on a project as complex and challenging as a nuclear plant decommissioning, the project organization will not function effectively if duties are not clearly defined and exercised. Squabbles over accountability detract from the work at hand and are rarely productive. Three examples from the Connecticut Yankee decommissioning illustrate the deleterious consequences of inadequate organizational definition.

Responsibility for Reactor Internals Segmentation. One of the first and most crucial tasks Bechtel undertook was segmentation of the reactor pressure vessel internals. Although not on the initial critical path, this work was especially important because it was a predicate for other essential tasks, for instance, removal of the highly radioactive waste for temporary storage in the spent fuel pool, draining the reactor cavity and associated tanks that process radioactive water, removal of other major components in the containment building, decontamination of the containment building itself, and demolition of the containment. The segmentation operation is also difficult and dangerous. The highly radioactive internals must be cut underwater to maintain a shield for workers. The cutting process can also produce radioactive debris that must be contained to avoid wider contamination. Although the industry had some limited experience on these delicate operations, they were by no means commonplace.

As the DOC, Bechtel was responsible for choosing the segmentation method, but Connecticut Yankee had a significant oversight role: (1) to ensure that Bechtel's approach would keep workers' radiation dose levels as low as reasonably achievable, and (2) to prevent any major delays caused by equipment or procedure failures with subsequent ramifications for the entire project. Consistent with this assignment of responsibility, the contract required Bechtel to give Connecticut Yankee an opportunity to review and observe any equipment or procedures tests, and Connecticut Yankee retained the right to stop the work if there were significant safety concerns.

Bechtel's chosen segmentation method had not been well proven. Indeed, at the first simulation test, some of the new equipment had not been operated at all, and the entire system was not even installed as a unit until well after the observation test. Even that incomplete test revealed conspicuous problems. For instance, the filtration system—which was vital to protect workers from unnecessary exposures and to prevent contamination spread—was not sufficiently robust and was prone to breakdown or overload. Even when Connecticut Yankee called these problems to Bechtel's attention, Bechtel took no satisfactory steps to prove the equipment in realistic field tests before beginning the work in the plant.

Perhaps because it was early in the project and Connecticut Yankee's managers were not yet comfortable with their oversight role, Connecticut Yankee did not exercise its authority to stop the work pending testing that would prove Bechtel's method. Instead, Bechtel proceeded with segmentation using equipment and procedures that had not yet performed under field conditions. Deficiencies became apparent immediately when the filtration equipment floated to the top of the reactor cavity, and the cooling water became so cloudy that operators could not see the cutting surface clearly. Still Bechtel—possibly motivated by schedule milestones that triggered both payments and penalties—forged ahead, and Connecticut Yankee took no steps to avoid a looming catastrophe.

As the segmentation work continued, the reactor cavity became more contaminated, and worker dose levels soared. At no point did either the Bechtel or Connecticut Yankee managers call for a stand-down to assess the viability of Bechtel's process or to effect modifications before the disbursed cutting debris had fouled the entire reactor cavity. Bechtel eventually managed to complete the segmentation, but the ensuing cleanup delayed completion of this subproject by 30 months and substantially increased the worker dose, prompting the NRC to intensify its inspections. Perhaps most importantly, the delay in draining the reactor cavity caused cascading delays, preventing removal of several water storage tanks and thus impeding access to subsurface groundwater contaminants.

Neither Bechtel nor Connecticut Yankee took the necessary steps to ensure that the crucial reactor internals segmentation work would proceed smoothly. Bechtel was primarily concerned about achieving contractual milestones while Connecticut Yankee feared that its actions might be construed as interference with Bechtel's chosen means and methods, thereby voiding propitious contractual provisions. Testing was undeniably insufficient, but each party proceeded based on its narrow interpretation of legal contractual rights and responsibilities—not cooperatively, based on what would be best for the project's success.

Responsibility for Groundwater Testing. Recognizing the uncertainty about contaminants in subsurface soils and groundwater, Bechtel carved out groundwater-related work from its turnkey responsibilities under the DOC contract. Connecticut Yankee agreed to contract language that treated groundwater work differently, but as the project progressed, it was clear that Bechtel and Connecticut Yankee had very different views about what those terms meant. Consequently, disputes about contractual responsibility for groundwater contamination plagued the project almost from its inception and led to the eventual demise of the DOC contract.

The plant's history of radiological leaks and spills and the absence of comprehensive groundwater and soil testing made it impossible to define the remediation scope of work when Connecticut Yankee hired Bechtel. Thus, the contract provided that the fixed price did not include "remediation, storage, transportation, disposal, and directly related services associated with contaminated Groundwater at the Site." Rather than focusing on addressing and resolving how thorny remediation issues would be handled under the contract, the two parties haggled for three years about the meaning of that exclusion and what their respective responsibilities were for groundwater contamination.

The first dispute arose over who would bear the cost for essential testing to assess the extent and scope of subsurface contamination. Connecticut Yankee's own initial studies found evidence of some contamination that Bechtel argued triggered the contractual exclusion and made all further groundwater testing cost reimbursable. Connecticut Yankee contended equally vociferously that Bechtel still bore the cost responsibility for some tests. While they bickered, no tests were conducted for 18 months, and the project lost precious time.

Once Connecticut Yankee authorized payment for groundwater testing, there were still protracted disputes about the types of tests that Bechtel would conduct. As noted previously, the plant's checkered history indicated the likely presence of hard-to-detect radionuclides like Strontium 90, which required more comprehensive soil or groundwater tests to identify. Despite NRC admonitions and Bechtel recommendations, Connecticut Yankee deleted Strontium 90 from Bechtel's testing plan until the Connecticut Department of Environmental Protection insisted that they look for hard-to-detect radionuclides. Not surprisingly, when Connecticut Yankee finally authorized Bechtel to look months later, it found high levels of Strontium 90 in several groundwater test wells. This belated discovery changed the course of the project.

Bechtel apparently saw the Strontium 90 discovery as a golden opportunity to recover some of its losses. It was behind schedule and hemorrhaging money on most aspects of the project. If it could convert some fixed-price work to cost reimbursable, it might yet salvage a viable financial position. Connecticut Yankee, on the other hand, sought to preserve its original turnkey concept of the project and to hold Bechtel responsible for any cost overruns or schedule delays. Thus, the parties were at loggerheads. Bechtel insisted that virtually all of the remaining work was constrained by the arguably boundless groundwater remediation, and it demanded that Connecticut Yankee issue a change order to develop a new work plan. Bechtel even began to de-staff several key activities on the grounds that it could not proceed until groundwater concerns had been resolved. Connecticut Yankee reciprocated that groundwater remediation was a trifling part of Bechtel's scope that had little if any impact on the remaining tasks, and no contract modification was warranted. Neither side seemed very concerned about the devastating impact that their wrangling had on project success.

All efforts to resolve this dispute reasonably failed. At first, Connecticut Yankee even refused to begin alternative dispute resolution procedures because the groundwater issues were not yet "ripe." When those discussions finally did begin, the parties could not agree on even the most fundamental premises. After six months of stagnation, the negotiations escalated to senior management for each side, but positions had so hardened, that success was not possible. In the end Connecticut Yankee acknowledged the inevitable and terminated Bechtel for breach of contract. From the ensuing litigation—which was inevitable given the rancorous relationship—Connecticut Yankee recovered only $15 million from Bechtel, a pittance of the costs the project incurred as a result of this disastrous affair.

Responsibility for Schedule Control. Under a classic turnkey project, the owner specifies the completion date, but the intermediate schedule necessary to achieve that objective is the contractor's domain. In a long, difficult project, however, a wise owner specifies other milestones and checkpoints so that the project's appropriate progression toward the defined end date can be assured. Still, there is a tension between the owner and contractor about who controls the schedule and what steps can and should be taken to maintain a schedule that will achieve project objectives.

Connecticut Yankee understood its need to monitor the intermediate schedule, and it included several contractual provisions to facilitate its schedule control. First, the contract made Bechtel's progress payments contingent on completing specified milestones such as final draining and decontamination of the reactor cavity or delivery of the reactor vessel to the disposal site. Conversely, unless excused by a force majeure, delays of more than 30 days in meeting any of nine key milestones triggered liquidated damages of $1 million. In theory, this approach motivates the contractor to perform the work that is most important to the project and that will keep the overall schedule on track. In order to succeed, however, the milestones must bear a logical relationship to the way the work will be performed and to the sequence that is necessary to complete the project. That logical relationship is the essence of a critical path schedule, but when Connecticut Yankee executed the DOC contract, it did not have a detailed critical path schedule based on Bechtel's work plan. Thus, from the onset, there was a serious mismatch between the contractual payment milestones and the way that Bechtel actually planned to execute the work.

Second, the contract required Bechtel to give Connecticut Yankee monthly reports on (1) the percent of the work completed based on earned value calculations, (2) progress of the work relative to milestones, with identification of problems that may delay or hinder accomplishment of milestones, and (3) forecasts of expected work in the next month. The contract also obliged Bechtel to use critical path scheduling to plan and monitor its work and to give Connecticut Yankee weekly updates of that schedule. These are typical, minimal provisions that any owner should expect in order to track the work. On this project, however, these reports were either not prepared at all or were notoriously unreliable. As a consequence, Connecticut Yankee was largely in the dark about where the project actually stood and how the work was progressing.

From the start, the milestone payment/penalty provisions became almost irrelevant. The only contractual milestone that Bechtel actually met was the first—execution of the contract. As time passed, missed milestones were ubiquitous, and some were hundreds of days late. Of course, the liquidated damages provisions were useless once they had maxed out, as all of them did. As the missed milestones accumulated, liquidated damages lost any motivational effect, and instead of attempting to minimize or recoup delays, Bechtel scrambled to find those excuses that would qualify as force majeures and pleaded for contract amendments that would forgive the contractual penalties. In short, Connecticut Yankee's intended contractual remedies for Bechtel's delays became a dead letter.

Nevertheless, Connecticut Yankee's general approach was that any delays were Bechtel's problem because it had to achieve the final end state—NRC license termination—for the fixed price. Connecticut Yankee only paid Bechtel if it completed objective milestones, thereby presumably preventing payments from becoming substantially out of sync with the amount of work completed. Connecticut Yankee apparently believed that its favorable contractual structure was an almost complete surety against Bechtel's schedule failures.

In fact, these contract provisions proved to be impotent tools for maintaining the schedule or for protecting against the owner's cost increases. As delays accumulated, Connecticut Yankee had only two plausible alternatives: (1) it could attempt to wheedle and cajole Bechtel to recover the lost schedule, or (2) it could take draconian action to terminate Bechtel's responsibility for part or all of its work scope. Connecticut Yankee's efforts to implement the first alternative were singularly unsuccessful, and it delayed pursuing the second alternative until after it had incurred crippling delays and enormous additional costs.

Only eight months after executing the Bechtel contract, the project was already eight weeks behind schedule, and Connecticut Yankee harped on schedule performance problems throughout Bechtel's DOC tenure. Connecticut Yankee repeatedly nagged Bechtel to improve its performance and to produce schedule recovery plans, all to no avail. Bechtel realized that Connecticut Yankee had minimal clout under the contract without exercising its right to terminate, and, not surprisingly, Bechtel conducted the project with its own financial interest paramount. Bechtel had no financial incentive to add shifts to expedite the work because to do so would only increase its costs without expunging the already incurred penalties. Bechtel had Connecticut Yankee over a barrel.

Moreover, because the designated contractual milestones did not track Bechtel's work plan, there were significant mismatches between the work completed and the payment schedule, and these incongruities both benefited and disadvantaged each of the parties. For instance, Bechtel repeatedly complained that the milestone payments did not match its cash flow needs, and it constantly sought modifications to the milestones. On the other hand, the milestone payments for removing the spent nuclear fuel to an onsite dry storage facility were heavily front-end loaded so that when Connecticut Yankee terminated Bechtel, it had paid almost all of the $55 million allotted to that work, but Bechtel had completed only a small fraction of the actual scope on an earned value basis. The disconnect between the contract milestones and Bechtel's critical path schedule made the milestones an ineffectual control tool.

Connecticut Yankee exercised no better oversight using Bechtel's contractually mandated reports. First, it took Bechtel a year and a half into the project to produce its first integrated critical path schedule, and even then, Connecticut Yankee did not consider it satisfactory. Once the groundwater contamination issues arose, Bechtel abandoned any effort to produce a comprehensive project schedule, contending that the dispute over a remediation plan so disrupted all work that no realistic schedule was possible. Thus, for most of Bechtel's tenure, there was no viable critical path schedule to guide planning, execution, or oversight.

By default, Connecticut Yankee relied heavily on Bechtel's reports of percent complete. Bechtel never shared its earned value system with Connecticut Yankee, however, so it was never clear precisely what the percent complete measured or what it meant. Nevertheless, it was clear that the project stagnated for more than a year while Bechtel's percent complete report showed almost no real progress. Connecticut Yankee's managers admitted that they were reduced to measuring the status of the work by "looking out their windows," where it was plain that Bechtel was making no significant headway. They discounted Bechtel's percent complete reports that showed 65 percent of the work done and "guessed" that the work was actually only about half complete when Bechtel was terminated.

In the face of this pervasive failure of schedule controls, Connecticut Yankee had neither the means nor the will to take decisive action to correct glaring deficiencies. While Connecticut Yankee may have believed this was Bechtel's problem alone to resolve, it could not prevent Bechtel from either abandoning the work or precipitating its own termination for cause. Either alternative may have been preferable for Bechtel over bleeding cash by continuing the work. Divided responsibility for schedule control, coupled with ineffective legal tools to enforce that control, meant that no one managed the schedule.

16.4.3 Terminating the DOC and Unifying Responsibility

After four years of largely derelict performance, Connecticut Yankee terminated Bechtel, but at great cost to almost everyone concerned. By then the project was three years behind the planned schedule and would cost twice as much. Not only did Connecticut Yankee's board of directors terminate the DOC contract, but they promptly cleaned house within the company and replace all of its key management. Bechtel sued Connecticut Yankee seeking more than $50 million in damages for wrongful breach of contract, and Connecticut Yankee countersued, seeking almost twice that much for Bechtel's default on the contract. These claimed costs paled in comparison, however, with the more than $300 million in actual increased costs incurred over the course of this acrimonious relationship that Connecticut Yankee promptly asked regulators to pass on to the parties whose money was really at stake—New England's electric ratepayers.

With fingers being pointed in every direction, no one was likely to come out ahead. As usually happens, after lengthy, costly litigation, Bechtel and Connecticut Yankee resolved their suits when Bechtel agreed to pay Connecticut Yankee $15 million—hardly a victory for either side considering the enormous cost overruns on the project. Despite a vigorous effort, New England ratepayers could not satisfy the severe burden of showing that Connecticut Yankee acted "imprudently," and they must pay for the cost overruns to complete decommissioning.[6] Only Connecticut Yankee's shareholders escaped any financial loss from the undeniably failed DOC contract.

Of course, following Bechtel's termination, Connecticut Yankee was left with the task of completing the remaining work that Bechtel left only half done. Once burned, Connecticut Yankee abandoned the DOC model and undertook its own direct management of decommissioning. Its entirely new management team—mostly recruited from the very successful decommissioning that was then winding down at Connecticut Yankee's sister plant in Maine—quickly engaged execution contractors to pick up Bechtel's uncompleted work, adopted an aggressive groundwater remediation plan, renegotiated more favorable waste disposal contracts, accelerated plans for moving spent nuclear fuel to onsite dry storage, implemented an earned value control system, and planned an expedited technique for demolishing the containment structure in half the time.

This team belatedly used lessons learned from Maine Yankee—which also experienced DOC performance problems but switched swiftly and decisively to the direct management model and completed decommissioning on time and within budget—to effect a transformation at Connecticut Yankee. As of the end of 2006, the Connecticut Yankee project was nearly complete, successfully meeting the cost and schedule objectives set after Connecticut Yankee terminated the DOC contract. This unified responsibility approach was able to focus on particularly challenging tasks like groundwater remediation and containment demolition to derive innovative, cost-effective solutions that had escaped the DOC contractor and its Connecticut Yankee management for years. Instead of merely administering a flawed contract in a vain effort to preserve its illusive benefits, the new Connecticut Yankee management acted forcefully to coordinate, control, and direct the project with a single objective—to complete the work at the lowest cost.

16.5 LESSONS LEARNED

Connecticut Yankee's decommissioning project demonstrates the fallacy of relying on legal solutions to address fundamental management problems. Generally, it is not possible to litigate one's way out of a failed project. Rather, legal relationships in projects should reflect project realities and proven best practices. The Connecticut Yankee experience illustrates six key principles.

16.5.1 Create the Appropriate Legal Framework to Match Project Realities

Complex projects are rarely so routine that they are amenable to cookie-cutter solutions. Thus, while it is tempting to structure the legal relationships in a project based on an "ideal" model, such an approach is likely to fail if it does not consider the peculiarities that make each project unique.

Connecticut Yankee—perhaps driven by a desire to shield itself from regulatory criticism by "fixing" costs—chose a contract form that could work effectively if conditions were optimal but, under less auspicious circumstances, could be a Petri dish to breed disputes and paralysis. There are several conditions necessary for a fixed-price turnkey contract to work effectively: (1) the project scope must be well defined and understood by both parties, (2) the means and methods for performing the work should be known and proven through experience, (3) costs should be predictable, (4) the contract price should reflect a fair assessment of those costs, including a reasonable profit for the risk assumed, (5) contract terms should unambiguously define what is within and outside the contractual scope, and (6) the owners' and contractors' roles and responsibilities should be clearly specified. No fixed-price contract terms will be sufficiently airtight to preclude a disaster when these conditions are not met. If the prerequisites for a fixed-price contract are not present, the owner should either wait until the necessary predicates can be satisfied or opt for more realistic arrangements instead of trying to force fit a project into an incompatible mold.

16.5.2 Emphasize Project Management Fundamentals

No legal shield will compensate for failure to apply the central project management tools for planning, organization, and control. Connecticut Yankee's management relied heavily on its advantageous contractual structure, expecting that it had erected an almost absolute fortress against cost overruns and schedule delays. It apparently believed that a fixed price that would be paid only when the contractor met explicit milestones would make close owner supervision unnecessary. Events showed, however, that no contract structure can eliminate the need for vigilant, effective owner oversight.

Even though Bechtel had contractual responsibility for planning the means and methods used to segment the reactor internals, Connecticut Yankee could not watch idly when field testing was patently insufficient and when failure to prepare adequately would have predictably grave consequences. The fixed-price contract offered little protection when organizational responsibilities were so poorly defined that the parties lost precious time bickering over who had to pay for groundwater testing. Finally, no contract can provide a failsafe template for control if the owner does not have accurate, transparent, timely, and reliable schedule reports.

16.5.3 Maintain Flexibility

The needs of the Connecticut Yankee decommissioning project evolved dramatically, but for too long its management stuck with a rigid enforcement of contract rights, without regard to whether that path would lead to project success. Connecticut Yankee's managers believed they understood the parameters of the project when Bechtel began its work, and they structured their oversight accordingly. When Bechtel stumbled, however, or when the facts morphed into a different reality, Connecticut Yankee did not adapt as quickly as the project required.

Project managers must assess new information or circumstances objectively and revise course, if necessary, to achieve project success. For instance, the discovery of Strontium 90 in the groundwater dramatically changed perceptions about the project, regardless of its impact on the remediation work itself. At a minimum, it was clear that Bechtel could not or would not proceed on the basis of the prior contractual arrangement. When Bechtel cut its workforce, arguing that uncertainty about groundwater cast a pall over all the remaining activities, Connecticut Yankee could not reasonably proceed with business as usual—as it nevertheless did for months. At that point only a change in the contract (such as redefining responsibilities or relieving Bechtel of some work scope), in Connecticut Yankee's management approach, or in the management team itself could turn the project around. The project's legal arrangements are a tool to an end, and if they no longer serve that end, the project team should not hesitate to change them.

16.5.4 Take Timely, Decisive Action

On a long project spanning several years, managers may not feel a sense of urgency to resolve disputes not directly impacting the critical path. On the Connecticut Yankee project, issues—like responsibility for groundwater testing—that could have been resolved quickly, instead smoldered for months or years, eventually taking on a life of their own. By that time positions had hardened and the parties were entrenched so that compromise became even more difficult, and the accumulated bitterness spilled over to affect other issues. Meantime, the need for a resolution had become acute, and precious time had been squandered.

A prompt resolution permitting the project to move forward may be preferable to maintaining a legalistic position that detracts from project objectives. Connecticut Yankee faced such a dilemma during the stalemate with Bechtel over responsibility for groundwater remediation. Either possible resolution—accommodating Bechtel by modifying the contract or immediately terminating Bechtel and letting Connecticut Yankee manage the project directly—was preferable to losing a year with little productive work completed. These were significant decisions for the project, but they needed to be made expeditiously based only on what would further project goals.

16.5.5 A Failed Project Costs Everyone

There are rarely winners when a project flounders. Litigation is a blunt instrument, and outcomes are never certain. Thus, no one should expect to "get well" through a suit at the end of a disastrous project. Indeed, projects managed with an eye toward possible legal action are more apt to fail.

Connecticut Yankee and Bechtel managers often spent more time and effort documenting their respective legal cases than they did actually planning, directing, and controlling the project. Formal letters between company counterparts, whose offices were within shouting distance, were obviously intended to build a record, not to resolve a problem. Each side attempted to use the contract to gain an economic advantage when their focus should have been on making the project run more smoothly.

In the end, no one achieved the advantage that they sought, and Connecticut Yankee's shareholders were spared ruinous losses only because they were able to recover all their costs from captive ratepayers. In addition to its $15 million payment to Connecticut Yankee and its losses during the project, Bechtel undoubtedly suffered damage to its usually sterling reputation for completing difficult projects. This was hardly Bechtel's most shining moment, and its dirty laundry was aired in very public litigation. Connecticut Yankee's key managers were all displaced in favor of an entirely new team. Most significantly, ratepayers—who had no role in the project's management—had to pick up a tab for more than $300 million in additional costs. Virtually all of these costs could have been avoided with sound project management focused on defining roles and maintaining control.

16.5.6 Nuclear Projects Are Manageable

Nuclear projects of all sorts have a deserved reputation for massive cost overruns and schedule delays. Although the Connecticut Yankee decommissioning project follows that same pattern, it also shows that sound project management techniques can be applied to control cost and schedule, even within the volatile and challenging nuclear project environment.

The problems that plagued Connecticut Yankee's decommissioning are familiar to project management professionals, and they are not unique to nuclear projects. Sound emphasis on established project management principles can avoid the kind of calamities that befell Connecticut Yankee. Indeed, the post-Bechtel experience shows that there was nothing endemic in nuclear projects that made them unmanageable. Rather, when Connecticut Yankee's new management focused on achieving project objectives and structuring the legal relationships to match those goals, the project was remarkably successful. Nothing inherent in the new generation of nuclear plants to be built over the next decade distinguishes them from other complex projects that managers have completed on time and on budget.

16.6 CONCLUSION

Legally defined contractual relationships and mechanisms to resolve legal disputes are tools that can serve the project manager well when used judicially. They cannot, however, drive execution and oversight of the project and will not compensate for gaps in planning, organization, and control. The Connecticut Yankee decommissioning project demonstrates that nuclear projects are not fundamentally different from other large, complex projects, and there is every reason to believe that proven project management approaches will be successful in managing the expected new generation of nuclear power plants.

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CHAPTER 17
USING INTEGRATED PROJECT MANAGEMENT TO IMPROVE OUTSOURCING STRATEGY AND BUSINESS RESULTS

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ABSTRACT

More and more companies and government organizations worldwide are increasing their use of outsourcing, also referred to as *contracting-out* or *privatization.* As a result of increased outsourcing, more risk is being transferred between organizations involved in business transactions. As the use of outsourcing strategy grows to help organizations reduce expenses and improve performance, so does the customer's demand for flawless execution by their outsourcing/supply chain partner(s).

With the global growth of outsourced projects, leveraging the full power of integrated project management is needed in order to improve the outsourcing strategy and business results. This chapter discusses what it takes to create and leverage a Project Management (PM) discipline across multiple

parties (buyer, seller, and subcontractors) involved in planning and executing complex projects in an outsourcing environment. This chapter introduces the Integrated Project Management (IPM) Life Cycle and IPM Model to improve outsourcing strategy and business results.

17.1 INTRODUCTION

Every project has a customer or multiple customers/users. Every outsourced project by definition is a goal-oriented undertaking of multiple tasks, often interdependent in nature, increasingly involving multiple parties, including customer, principal supplier, supply-chain partners (subcontractors), and other third parties to develop or provide products, services, or solutions within a given period of time. One of the key reasons why outsourced projects fail is because the project leaders and/or their executives lose focus on what is important. Too often projects suffer from vague and constantly changing customer requirements combined with inadequate or incomplete customer acceptance criteria—a recipe for project failure. Everyone involved in the planning and executing of an outsourced project must maintain focus on their customers' goals. Projects succeed only if the customers' needs are met or exceeded.

Creating an IPM discipline across multiple parties involved in a project does not happen overnight. In fact, based upon research, most organizations that have effectively implemented IPM discipline, have spent years evolving from functional or product/service-oriented organizations to IPM organizations. Further, based upon research and experience, it has been determined that many organizations that have effectively developed an IPM discipline have evolved through five distinct phases of the IPM Life Cycle: (1) awakening, (2) implementing, (3) professionalizing, (4) enterprising, and (5) integrating, (see Figure 17.1).

17.2 INTEGRATED PROJECT MANAGEMENT (IPM) LIFE CYCLE (5 PHASES)

17.2.1 Awakening Phase

The *Awakening Phase* is the first experience of an organization creating an institutionalized IPM discipline. During this phase of development, leadership's involvement and support is crucial because it is during this phase that project management's effect on the business is evaluated. The

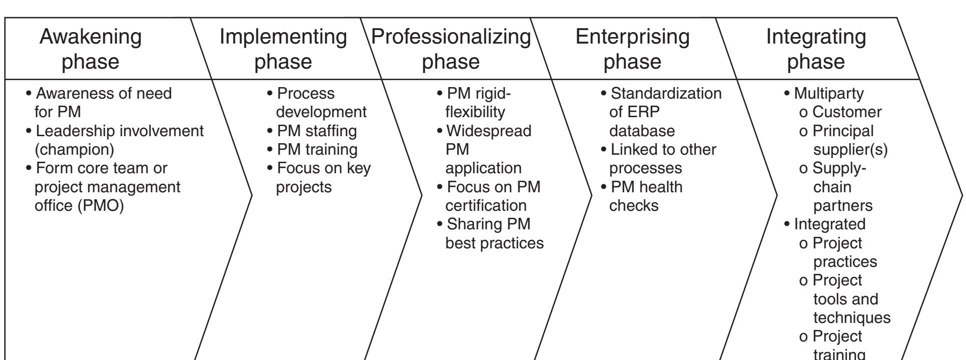

FIGURE 17.1 IPM life cycle by phase.

application of the IPM discipline across multiple related projects has proven successful with numerous organizations and companies for improving business performance. Improved business performance is typically viewed or translated as reduced costs of operation, reduced cycle time, increased revenues, increased profitability, and greater customer satisfaction. Many organizations and companies, including ABB, AT&T, Bechtel, Boeing, Cisco, EDS, Ford, GM, IBM, Lucent Technologies, NCR, Northrop-Grumman, NTT, USAA, and others have moved rapidly during the past 10 years to take advantage of PM's promise, initiating its implementation as a discipline within their organization. Most companies formed a headquarters core PM team or Project Management Office (PMO) charged with establishing a constant but flexile PM discipline that could be quickly applied for all organization projects.

In the awakening phase, leadership is crucial. In non-project-based organizations, functional organizations such as engineering, manufacturing, installation, and sales have traditionally operated independently from their peer organizations. For PM to be successfully implemented, organizations must change from a functional or product-oriented operating structure to a project-oriented one.

To ensure that the entire organization benefits from the implementation of PM, the executives of several companies, including AT&T, NCR, Hewlett-Packard, and others established a corporate-wide Project Management Leadership Council consisting of directors from every business unit. This council is chartered to provide a forum for the project management community to foster the growth and development of a world-class corporate project management resource. Companies with a Project Management Leadership Council have helped foster project management's attributes by sharing lessons learned and best practices throughout their respective companies.

17.2.2 Implementing Phase

The second phase an organization will experience is *Implementing* project management, the most expensive and labor-intensive phase in creating an IPM discipline. In most organizations the core PM team, sometimes called a PM Center of Excellence or Project Management Office (PMO), is critical to making the implementing phase work. Staffed with a small team of experienced project managers from both internal and external sources, this core PM team or PMO focuses on developing processes, training, and supporting large programs. To help jump-start the effort, many organizations have supplemented the team's or PMO's knowledge by bringing in experienced external PM consultants. Initially, most organizations outsource program/project management training to one or more of many university or training firms. The training, essential in the implementing phase, must be focused on project management principles and practices and on customer requirements management. The intent of the PM curriculum, which should be based upon the Project Management Institute (PMI) Project Management Body of Knowledge (PMBOK), is to provide managers with sufficient knowledge to start applying the PM discipline in their work environment.

During the implementing phase, the main function of the core PM team or PMO is typically to provide experienced project managers to augment newly formed PM teams, sometimes temporarily. In this phase PM implementation is usually concentrated on selected large projects. The driver behind placing experienced project managers on selected projects is the belief that concentrating talent to the largest projects would lead to the highest return. Choosing highly visible projects to internally showcase and document PM successes and lessons learned is vital in this phase. Internal support can be obtained only by successfully performing these showcase programs.

17.2.3 Professionalizing Phase

The third phase an organization will undergo is the *Professionalizing* phase, in which the PM discipline is strengthened and PM tools are improved. During the professionalizing phase many organizations establish the concept of *rigid flexibility* to ensure key PM practices, based upon the PMI PMBOK, are successfully executed. Also during this phase PM application becomes widespread throughout the organization, including creating specific PM objectives to proactively manage scope, schedule, cost, and customer relations. Clear PM objectives setting is essential in the first steps toward widespread application of the discipline.

During the professionalizing phase, most companies like Cisco, IBM, USAA, and others have undertaken several actions to improve their level of PM professionalism, including encouraging project managers to obtain the PMI's Project Management Professional (PMP) certification. To further support communication and professionalism several companies, including Hewlett-Packard, USAA, and others have conducted a yearly project management conference, which serves as an important medium for communicating and applying PM lessons learned throughout the organization. Many companies such as CH2M Hill and Sun Microsystems have also improved professionalism by creating an intranet PM web site to facilitate dialogue within their PM community. In addition, companies like Bechtel and Northrop-Grumman have introduced project controls specialists to help them improve their respective project managers' efficiency by allowing them to focus on customer and management issues instead of on data collection. In the professionalizing phase, most organizations continue developing their internal PM process documentation to facilitate rapid and consistent implementation and sharing best practices.

17.2.4 Enterprising Phase

Enterprising is the fourth phase of creating an integrated project management discipline. Connecting the various projects and programs is pivotal to take company-wide advantage of every business opportunity. Effective use of company resources across multiple projects can be obtained if processes and tools are compatible among these projects. Standardization of progress reports and tools to generate these reports is the first step in this phase. Lucent Technologies has created a tool called WallChart which is used worldwide. Lucent's WallChart uses the power of the Internet to create and communicate program progress reports. WallChart provides Lucent's project managers and program managers with an effective way to create and distribute reports worldwide to senior company executives. WallChart has increased the project managers' willingness to communicate project status in real time, both internally and with their customers. Lucent's WallChart has proven a successful tool for global facilitation of resource management and escalation processes.

Another important step in enterprising is standardization of resource codes and names used in planning tools. In organizations that manage large, complex, outsourced projects consuming hundreds of resources, the tracking of these resources is often done using resource categories (for example, engineers) instead of specific individual resources. Cross-project agreement on how to use and code these resources is essential before enterprise project management can become a success.

Linking PM processes with other processes within an organization, such as engineering, manufacturing, installation, customer service, logistics, asset management, financial management, and contract management is vital within the enterprising phase. Many organizations have worked in partnership with companies like Microsoft, Oracle, SAP, and others to develop an IPM implementation database and process description. In this process all interfaces, such as those between PM and contract management, are agreed to and documented. This integrated process description also includes an analysis of current information systems and outlines the target system architecture for the business.

A few companies, including EDS, IBM, and others, have used the integrated process description in "Health Checks," or project team assessments. During a PM health check, members of the headquarters organizations or PMO visit project teams and evaluate or audit their performance against the organization's integrated process and systems architecture description. Typically, the desired outcome of these health checks is a road map to migrate the project to standard processes and systems and documented PM best practices. An important difference between a financial audit and this health check is that the health checks are done by request and are conducted in a team-building environment. This collaboration between the project teams and the core headquarters organization or PMO uses the strengths of both and is a sign of a high-level PM discipline.[1]

17.2.5 Integrating Phase

Integrating is the fifth and final phase of creating an IPM discipline. The IPM discipline is based upon the premise that for projects to be successful in an outsourcing environment involving multiple-parties [customer, principal supplier(s), and supply-chain partners (lower tiers)], everyone needs to be unified and focused on achieving customer goals. Integrating is about all of the parties involved in a large, complex, outsourced project working together to achieve customer goals. There are four essentials to achieving an IPM discipline: (1) project practices, (2) project tools and techniques, (3) project training, and (4) project leadership.

17.3 CASE STUDY: NCR

During the period of 1993–1996 NCR, at that time an AT&T Company, formerly known as AT&T Global Information Solutions (AT&T/GIS), experienced a similar transformation as they successfully instituted an IPM discipline throughout their worldwide services organizations. AT&T/GIS aimed to provide customer-focused solutions that helped businesses better understand and serve their customers by more effectively getting, moving, and using customer information. Achieving this goal placed great pressure on the company's PM community.

The company has hundreds of project managers worldwide who collectively manage thousands of information technology projects. These projects ranged from relatively common installations of off-the-shelf computer hardware to highly complex multinational systems integration and professional services undertakings. The company also has thousands of other employees who serve as members of project teams. The company developed and implemented various means of fostering effective interaction among its project teams. The following information about these "best practices" may prove helpful to other companies seeking to enhance such interaction in their own work environments.

17.3.1 First Best Practice—GlobalPM®

AT&T/GIS empowered its project managers through the creation and implementation of a state-of-the-art project management methodology called GlobalPM. GlobalPM practices and techniques gave the company's project managers a clear, concise, consistent set of organizational processes, conceptual, and documentation tools. Throughout the world, they provided project managers and the team members who worked with them a consistent approach to managing highly challenging projects involving total business solutions.

17.3.2 Second Best Practice—Customer-Focused Teams

The company formed several hundred customer-focused business teams to implement a new customer-focused business model. A customer-focused team is a multifunctional unit dedicated to understanding a specific customer's needs and interests and working to deliver solutions fitting the customer's unique organizational profile. Each team was headed by a team leader and made up of representatives from various functional areas. All team members were focused on helping the customer reach its business goals. The team had the decision-making authority, responsibility, and accountability needed to be fully responsive to the customer's business needs. Its goal was to work together with shared values and a common bond to delight the customer.

17.3.3 Third Best Practice—Early Involvement of the Project Manager in the Business Process

The company has learned that early involvement of their project managers in pre-contract award activities is a proactive means of mitigating risk. Often project managers can give sales and marketing managers critical insights into the value of certain requirements and the realistic opportunities of achieving the results the customer desires. Project Managers can, for example, assess whether cost and schedule estimates are realistic, analyze the risks and the opportunities the project provides, and recommend special terms and conditions for tailoring the contract to the project goals.

17.3.4 Fourth Best Practice—Shared Lesson Learned

"If you always do what you always did, you will always get what you have always got!" The project management team, customer, and other suppliers must all work together to document the successes and failures of their endeavors so as to be able to learn from the past. The company recognized that it needed to improve its efforts to ensure sharing lessons learned is done on a consistent basis with all parties involved.

17.3.5 Fifth Best Practice—Professional Development Programs and Certification

The company promoted and provided professional development programs for its PM teams globally. It has sent hundreds of its managers through a comprehensive professional development program in PM offered by The George Washington University. Also, the company actively promoted professional certification in PM, via the PMI, PMP certification. Clearly, the leadership of NCR, formerly AT&T/GIS Worldwide Professional Services organization, saw the value of integrating the PM discipline within their company and evolved over several years through the phases of the IPM process.[2]

17.4 CASE STUDY: HEWLETT-PACKARD

Hewlett-Packard (HP) learned many years ago the value of implementing PM and integrating the PM discipline throughout its business. Between the late 1980s and 1990s, HP's revenues doubled. During that time period the company's worldwide customer support system recognized that customer's requirements were becoming increasingly customized and complex. HP's customers needed flawless execution of complex outsourced projects, involving multiple suppliers, to provide total business solutions. Various HP support services were becoming more important and were at times being viewed as key market differentiators. HP's executives decided to expand its customer support sales organization and develop project management as a core competency.

HP formed a PMO within their support organization. The charter of the PMO was to develop PM expertise throughout the company to meet the challenging needs of their customers. To facilitate the implementation of PM, an aggressive PM training program and a mentor program was established. The mentor program partnered experienced project managers with newly assigned project managers to help support their professional development. As professionalism in PM grew at HP so did their efforts to achieve industry recognition through PMI, PMP certification. Today, HP is widely recognized for their demonstrated expertise in managing complex outsourced projects and meeting or exceeding customer expectations. HP, like NCR and many other companies, understand and value the importance of execution. HP has shown to their customers and suppliers that the joint use of proven project practices, project tools and techniques, project training, and project leadership improve performance and help to leverage customer loyalty.[3]

17.5 CASE STUDY: LOCKHEED MARTIN

Lockheed Martin has a long and rich history of innovative and highly successful project management. Before the merger of Lockheed and Martin Marietta, each company had developed and delivered many successful products and programs for the U.S. Department of Defense (DOD). For example, Lockheed, via their Skunk Works, developed the United States' first operational fighter jet, the P-80, from concept to first flight in just 143 days in 1945. In 1955, the U-2 went from concept to first flight in just eight months. The SR-71 Blackbird, still considered one of the most advanced aircraft ever developed, was created from concept to its first flight in 32 months. All of these highly successful projects shared several common best practices.

The history of Lockheed Martin demonstrates seven key project management best practices:

- Secure top talent (project management, systems engineering, and manufacturing).
- Ensure process focus (well-defined program, product development, and subcontract management methodology).
- Build a small and collocated integrated project team (common goals and excellent teamwork).
- Create an empowered one-team environment, including customers and suppliers (the right people, budget, and work environment).
- Ensure use of latest commercial products, technologies, and practices.
- Implement rapid development life cycle.
- Select a dynamic program manager (leader).

While not all of Lockheed Martin's defense programs have achieved the tremendous success of these early programs, these seven best practices remain today as excellent benchmarks for managing complex outsourced defense programs.

17.6 INTEGRATED PROJECT MANAGEMENT (IPM) LIFE CYCLE: LESSONS LEARNED

An Integrated Project Management Corporation should view every internal and external business activity as a project and the grouping of related projects as programs. A true world-class organization uses the power of the IPM discipline to set proper expectations with its customers and leverages its suppliers to reduce cycle times and costs, improve on-time delivery, and ensure customer satisfaction. Nearly any organization and its related customers and suppliers can evolve through the Awakening, Implementing, Professionalizing, Enterprising, and Integrating phases of the IPM Life Cycle given executive support and resources The real key to creating an IPM discipline is the ability to do it well, do it fast, and exceed customer expectations.

Based on years of extensive experience and research, there are five project elements which must be accomplished to successfully manage complex outsourced projects and achieve the fifth and final level or phase of the IPM Life Cycle—the Integrating phase: (1) Customer Needs and Goals, (2) Supplier Value Chain, (3) Project Communications, (4) Project Teamwork, and (5) Integrated Project Management Discipline. The combination of these five project elements form the IPM Model (Figure 17.2). The IPM Model is a visual tool designed and intended to help every member of a project team, including customers, suppliers, and supply-chain partners, understand what it takes to make outsourced projects succeed. The focus of this chapter is to provide an overview of the five project elements required to truly achieve the fifth and final level or phase of IPM.

17.7 FIRST PROJECT ELEMENT: CUSTOMERS' OUTSOURCING NEEDS AND GOALS

In both the public and private sectors, listening to and understanding customers' needs and desires is critical to ultimate business success. Appropriate customer intimacy is a valuable and valued trait. Of course in federal, state, and local government contracting there are many rules and regulations

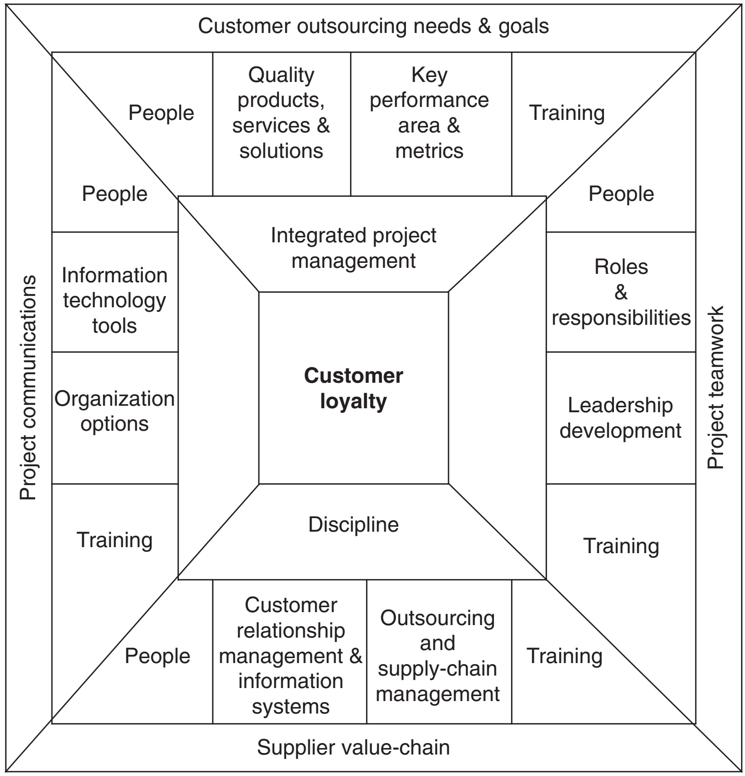

FIGURE 17.2 Integrated project management (IPM) model.

that govern appropriate behavior. Customers want suppliers who know what they really need, what they desire to achieve (i.e., their goals), the difference between their needs and goals, and how to make both happen. Many customers expect their outsourcing business partners to become trusted advisors who help them meet or exceed their needs, thus achieving higher levels of performance enabling them to reach their goals (see Table 17.1).

17.7.1 Understanding Outsourcing Customer Needs

An all-too-common fundamental mistake, especially when dealing with complex outsourced projects, is a lack of true understanding of the customer needs. Translating a customer's general business needs into specific performance requirements is a real challenge. Further, translating specific

TABLE 17.1 Customers' Outsourcing Needs and Goals

On-time delivery (to customer need date)
Cost reduction (lower operations and support costs)
Short cycle time (from request to delivery)
Best-value pricing
Breakthrough technology
High-quality products, services, and solutions
Supplier financing
End-customer/user satisfaction
Ongoing customer service

customer performance requirements into tailored business solutions comprised of numerous products (hardware and software) and professional services is a significant challenge requiring the effective use of the IPM discipline.

17.7.2 Outsourcing Translating Customer Needs into Projects

Today, customers usually organize and plan their needs or requirements into specific projects. Often, customers will have numerous related requirements, which involve delivering similar products or services to various geographically diverse locations. Customers typically group related projects into programs to facilitate the work and sharing of limited resources. Sometimes customers internally plan, schedule, and execute programs and their related projects with their own employees to achieve their needs. However, customers are increasingly outsourcing some or all of the work (products and/or services) required to meet their needs.

17.7.3 Four Major Inputs to Fulfill Customer Outsourcing Needs

- **People** To achieve customer needs the customer outsourcing and suppliers must assemble a small team of talented and experienced professionals to assess the real organizational needs, distinguish between needs versus desires, establish appropriate performance-based requirements, and then determine what efforts are best performed internally by the organization and which needs are best fulfilled via outsourcing.
- **Quality Products, Services, and Solutions** Ultimately, what all customers want are quality products, services, and/or solutions to meet or exceed their mission requirements at a fair market-based price.
- **Key Performance Areas and Metrics** In the past, most customers described or defined the exact products and services they desired, often with detailed statements of work and rigid specifications. Today, more and more customers are creating performance-based requirements for their projects both internally and externally (outsourced). As a result, customers should work closely with their suppliers to ensure mutually agreeable or agreed upon performance areas and related performance metrics are included in their project acceptance criteria. The use of performance-based contracts and related projects allows the suppliers greater flexibility, thus the opportunity to be more innovative in meeting or exceeding the mutually agreed upon performance requirements. Performance-based requirements must be clearly stated, challenging, measurable, realistically attainable, and most importantly mutually agreed to between customer and supplier. The most effective performance-based requirements are also linked to performance incentives, both positive and negative.
- **Training** Customers should ensure their personnel involved with establishing organizational requirements/need statements are well educated and trained, including preparing performance-based requirements and Statements of Work, developing solicitation documents (e.g., Requests for Proposals and Invitations to Bid), and developing performance-based incentives, metrics, and acceptance criteria.

17.8 SECOND PROJECT ELEMENT: SUPPLIER VALUE CHAIN

For suppliers to survive and thrive in this increasingly competitive global outsourcing marketplace they must be highly focused on their customers' needs and goals. The supplier's leadership must instill a culture focused on helping customers achieve their goals and creating an ethical win-win professional business environment. The supplier's leadership must ensure they are providing value-based products, services, or solutions that help their customers solve their problems and maximize their opportunities.

More suppliers are learning the importance of leveraging their supply chain to add value to their customers, while also helping them reduce their expenses and cycle time. As the use of outsourcing increases worldwide, the power of supply-chain management is significant and growing. Converting vendors or subcontractors into value-based business partners is critical to transferring the supply chain into a supplier value chain.

17.8.1 Making Projects Succeed via the Supplier Value Chain

Most suppliers translate customers' outsourcing needs into customer orders. Customer orders are then converted by suppliers into projects. Projects may involve products (hardware or software), professional services, or integrated business solutions, which typically contain a mix of the principal supplier's content and some degree of outsourced products and services from supply-chain partners.

17.8.2 Four Major Inputs to the Supplier Value Chain

- **People** Suppliers must have a highly professional, well-educated, experienced, employee-oriented, and customer-focused leadership team. Too often suppliers' business leaders are too inwardly focused on short-term cost reduction and quick-fix productivity improvements, via laying-off or firing employees while forcing other employees to handle more work for the same or even less pay. Supplier leadership must be focused on achieving customer goals in a cost-effective and efficient manner by building strategic partnerships with their customers and their vendors while supporting their employees and shareholders.
- **Customer Relationship Management and Information Systems** In order for a supplier to be successful it must develop effective and efficient business processes. Suppliers must reduce or eliminate non-value-added work and ensure well-defined hand-offs areas between their customers, their employees (functional organizations), and their supply-chain partners. Information systems that provide suppliers with current, accurate, and timely data are extremely valuable assets to enable suppliers to maximize their performance (reduce costs, reduce cycle time, and increase profitability). Increasingly, suppliers are purchasing Customer Relationship Management (CRM) software to help them standardize their business processes, increase their information accuracy, and improve their customer responsiveness.
- **Outsourcing and Supply-Chain Management** More and more organizations have come to realize the inherent value in more closely managing the products and/or services they outsource from other companies. The Institute of Supply Management (ISM) formerly the National Association of Purchasing Management (NAPM) has recognized the important evolution of simple commodity purchasing to the increasingly value-added role of supply-chain management. Likewise, more and more universities worldwide are transitioning their purchasing programs within their business schools to teach the value of supply-chain management. Simply said, supply-chain management is about delivering value to customers as cost-effectively as possible. Clearly, the concept of supply-chain management should evolve to a supplier value chain.
- **Training** As the level of outsourcing grows and the need for effective supply-chain management increases, so does the need for training more people on a variety of related topics (e.g., purchasing, contract management, customer relationship management, supplier relationship management, capture management, and supply-chain management).

17.8.3 Integrating the PM Discipline into the Supplier-Value Chain

The PM discipline can serve as an essential integrator to the suppliers' traditionally inwardly focused supply-chain organization, helping everyone stay focused on the customers' needs and goals. Again, the key to successfully integrate the PM discipline is to tailor the PM practices, tools, and techniques as appropriate to the respective projects. Another real value-added benefit to integrating PM into the supply-chain management organization is to have the respective project managers hold everyone accountable for their individual responsibilities, including customers, their company (the supplier), and their supply-chain partners. When project managers hold everyone accountable, it often causes constructive tension, which is essential to drive the project(s) to a successful completion.

17.9 THIRD PROJECT ELEMENT: PROJECT COMMUNICATIONS

Few actions are as important to the success of a project than communication between the parties involved with a project. Communication channels must be open, streamlined, and effective to ensure all appropriate people involved with a project receive the right information at the right time in the right way. Project communications are vital to make projects succeed, including ensuring customer needs (requirements) and acceptance are well criteria defined, documented, and mutually agreed upon; verifying customer obligations are understood and properly performed; and establishing mutually agreed upon performance metrics for key areas of performance between the customer, supplier, and supply-chain partners.

17.9.1. Four Major Inputs to Project Communications

- **People** As in all discussion of communication the most important element or input is the people involved with the project. The most significant reason for the success or failure of any project is the people involved and their respective skills that they bring to the project. Effective oral and written communication skills are critical to project success. Communication skills are especially important for the project manager whose job is to frequently communicate what needs to be done, by whom, and when, to ensure the customer needs and goals are met or exceeded.
- **Information Technology Tools** Information technology has made it possible to conduct communications in various mediums, which are continually evolving. When considering information technology tools for project communications, one needs to consider the communication flow. Communication flows fall into three basic types: broadcast (i.e., one-way send), exchange (i.e., send and receive), and collection (i.e., one-way receive). Some information technology tools are more effective for certain communication flows than others.[4]
- **Organization Options** A favorite action of most new organizational leaders is to reorganize. Typically, organizational leaders reorganize to help them communicate or relate more effectively to the various functional or product/service-oriented departments within their span of control. Unfortunately, reorganizations often do not help improve the flow of communications amongst their people. There are various organizational options that can be selected to staff a project team.
- **Training** To maximize the effectiveness of project communications, all people involved with a project should receive timely team-based training. Suggested project communications training should include oral and written communication skills, information technology tools, diversity awareness, and others.

17.9.2 Integrating the PM Discipline into Project Communications

Clearly, project success depends on effective project communication. Within the project management discipline there are numerous tools and techniques designed to improve project communications:

- Work Breakdown Structure (WBS)
- Organizational Breakdown Structure (OBS)
- Responsibility Assignment Matrix (RAM)
- Master Integrated Schedule (MIS)
- Project Communications Plan
- Opportunity Assessment

- Risk Management Plan
- Points of Contact List
- Action Item Register (AIR)
- Project Status Reports
- Others

All of the aforementioned PM tools and techniques are commonly used and appropriately tailored for the projects they support to ensure the PM discipline is well integrated into project communications.

17.10 FOURTH PROJECT ELEMENT: PROJECT TEAMWORK

The involvement of groups of people into designated project teams is critical to making projects succeed. Teams should be the primary organizational structure, as previously discussed, to accomplish customer goals. Teams involve the internal organizational groups and include individuals from functional or product groups to form a multifunctional project team. Of course, the truly integrated project team includes individuals representing the customer, supplier, and supply-chain partners as appropriate. The size of an integrated project team and the skills and physical location of team members often varies based upon the needs of the customer and the specific project.

17.10.1 Four Major Inputs to Project Teamwork

- **People** The most important aspect of every project is the people involved. Selection of the right people for a specific project is often not carefully considered, resulting in frequent project failures. Just as in the case of sports teams, project teams take time to bond, gel, and evolve to a high-performance team. Chemistry between individuals is vital to creating a successful team. Selection of the right person to serve as the project leader is critical to project success. Likewise, failure of the project leader to resolve team member conflicts will negatively impact performance results and erode team morale. While all team members are important, they can all be replaced and should be replaced if they are not working as a customer-focused integrated project team.
- **Leadership Development** Every member of an integrated project team is important, every team member needs to actively contribute to project success, and every team member must be supported to help build leadership skills. There are numerous actions which can be taken to help team members build their leadership skills.
- **Roles and Responsibilities** As stated earlier, defining roles and responsibilities of team members is vital to building teamwork. Said differently, when roles and responsibilities are not clearly defined, problems multiply, costs increase, productivity decreases, and projects often fail to meet customers' goals.
- **Training** Project teamwork is an important input to making projects succeed. As previously stated, team-based training is an effective means of building teamwork in a project environment. Simply training individuals one by one does not allow the project team as a whole to understand the new tools and techniques, making the training less beneficial because changes are more difficult to effectively implement when everyone is not singing off the same sheet of music. Project teamwork is enhanced when the training is customized to real-world project scenarios, based upon the team's business environment.

17.10.2 Integrating the PM Discipline into Project Teamwork

Clearly, project teamwork is essential to successful projects. Integrating the PM discipline via PM practices, tools, and techniques performed by individual team members is a proven-effective means of achieving customer goals. The use of PM tools such as RAM, OBS, AIR, MIS, WBS, and others helps build teamwork and improve productivity.

17.11 FIFTH PROJECT ELEMENT: INTEGRATED PM DISCIPLINE

The concept of an integrated project management discipline is based upon the premise that for projects to be successful in an environment involving multiple parties—customer, supplier, and supply-chain partners—everyone needs to be unified and focused on achieving customer goals. Moreover, the concept of integrated project management is based on the practice of rigid flexibility. *Rigid flexibility* for PM means ensuring that key PM practices are followed on every project, while realizing *how* the PM practices are executed and *what* tools and techniques are most appropriate vary by project situation. Without truly integrating the PM discipline across all parties involved with a project and holding said parties accountable, it is nearly impossible to reach high-performance team results.

17.11.1 Integrated PM Essentials

There are four essentials to achieving an IPM discipline: (1) project practices, (2) project tools and techniques, (3) project training, and (4) project leadership.

- Project Practices Based upon the foremost professional association for the advancement of project management, the PMI, PMBOK, there are nine project management knowledge areas. Each of these areas contained within the PMBOK (see Figure 17.3) relate to one or more proven project practices.
- Project Tools and Techniques For every project practice, one or more project tools and/or techniques is available to help accomplish the work. A successful project manager is one who is knowledgeable in all nine areas of the PMBOK, is experienced in a variety of proven project practices, is aware of the numerous project tools and techniques available, and is mindful of when and how to apply specific project tools and techniques.

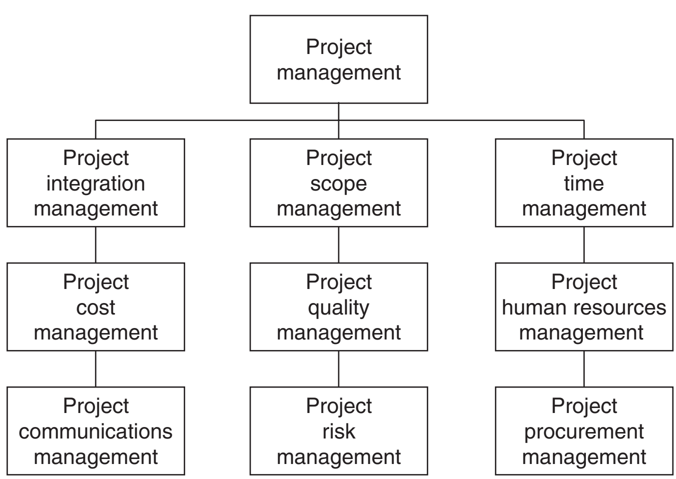

FIGURE 17.3 Overview of project management knowledge areas. (*Source*: PMI, project management body of knowledge).

- Project Training A tremendous amount of project-oriented training is available to help individuals and organizations improve their project performance. The best PM education and training is based upon the PMI, PMBOK, nine knowledge areas. The most effective PM training programs teach students to (1) understand the nine knowledge areas of the PMBOK, (2) know how to apply proven project practices to each of the nine areas of the PMBOK, and (3) be able to successfully use project tools and techniques to accomplish each of the proven project practices.
- Project Leadership Each of the four essentials to achieve an IPM discipline are important, but without real project leadership, projects usually fail. Real project leadership skills are not created in a classroom, rather they are learned and earned on the job managing real people, real money, in a real-world environment. Project leadership is about motivating or stimulating people to achieve higher levels of performance by working as an integrated project team. The most successful project leaders are usually goal-oriented, strong communicators with high-energy levels who serve as a coach, teacher, or trusted advisor to their project team members. Likewise, successful project leaders hold their team members accountable for their actions and results.

17.12 THE INTEGRATED PROJECT MANAGEMENT (IPM) LIFE CYCLE AND MODEL

In retrospect, the IPM Life Cycle and Model are both designed and intended to serve as visual tools to guide thinking and actions of the multiple parties involved in a complex outsourced project. With the global growth of outsourced projects, there is a tremendous need to leverage the full power of IPM to improve the outsourcing strategy and business results.

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CHAPTER 18
CONNECTING PROJECTS TO CORPORATE STRATEGY

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During his research work, he has developed close ties to the business community in Calgary. Recently, he gathered data for a unique database about social capital and leadership in top management teams. He is particularly interested in understanding how leadership at the upper echelons generates organizational-wide consequences, especially in relationship to organizational social capital. Paul has presented his research at several Academy of Management Meetings and at the meetings of The Administrative Sciences Association of Canada. He has published in the *The Leadership Quarterly* and in *Monographs in Leadership and Management.*

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18.1 OVERVIEW

Strategy is about matching an organization's capabilities to the changing market environments to achieve better competitive positions. Increasingly, companies are turning to project management to help them be more effective and efficient. This chapter introduces readers to key concepts and several frameworks in strategy that are applicable to project management. Specifically, the chapter discusses how project management influences the design of business strategies. Since project management typically is practiced at the operational level, we also explore how it can be structured and managed to engender more effective and efficient business strategies. The chapter concludes with lessons learned and practical guidelines.

18.2 INTRODUCTION

Developing organizational strategies is one of the biggest challenges companies face in the current hypercompetitive market environment. Managers must address numerous challenges, such as the reduction of trade barriers across international markets, industry deregulation, increasing pressures from the social and natural environments, and relentless challenges from competing firms. Furthermore, organizations are evolving into increasingly complex and technology-driven systems. To respond to such challenges, organizations require complex, specialized structures and detailed processes that are also flexible and nimble, in order to simultaneously respond to the external environment and develop the appropriate internal capabilities.

The roots of such contradictory demands come from different and usually incongruent forces. Customers are both cost conscious and demanding. People in society at large are as concerned about economic development as they are about environmental degradation; complex technologies have pushed companies to be more specialized and departmentalized, yet firms create value by developing synergies across different functional areas; and globalization requires that firms source resources from around the world, yet specific markets demand local responsiveness. It is within this strategic context that we examine project management contributions to organizations.

Throughout this chapter, the word *resources* refers to inputs for the productive function resulting in an output, such as a product or service. The *productive function* means that companies manage their inputs to the process in order to maximize their outputs (i.e., products and services) (Barney, 2002). *Capabilities* are the processes and systems implemented by an organization as it seeks to accomplish its productive mandate. A *core competence* can stem from resources or capabilities that lead an organization to a competitive advantage when compared to their direct competitors. A commonly used synonym for core competence is *strategic asset*. This terminology becomes clearer as we explain the strategic management processes in this chapter.

Companies have many resources (e.g., human, financial, organizational, physical, social, and technological), but few are sources of competitive advantage. Generic resources (such as supplies and materials) are easy to identify and access. Once combined with other resources, generic resources become capabilities that enhance a firm's ability to improve its productive function. Beyond generic resources, a select collection of specialized core competencies allows a firm to outperform rivals. Core competencies stem from resources applied during the production function to generate above-average returns. Core competencies signify complex, higher order interactions between resources, processes, and knowledge (Eisenhardt and Martin, 2000; Grant, 1991). Examples of core competencies include quality, reputation, managerial skills, brand recognition, patents, culture, technological capability, customer focus, and superior managerial skills (Hawawini, Subramanian, and Verdin, 2002). Since many core competencies are intangible (tacit and knowledge based), they may not always be readily visible.

The literature defines business strategy in many different ways, yet most definitions include the common theme of matching an organization's internal capabilities to the pressures of the external environment (Mintzberg, Ahlstrand, and Lampel, 1998). Companies face the challenge of equally *crafting* and *implementing* the correct strategies in light of contradictory demands from the external environment; they do so through appropriate strategic management processes. By attaining such a balance, organizations become more competitive and achieve better financial returns than their competitors do.

Increasingly, more organizations are turning to project management to help them be competitive. *Project management* is a set of processes that encompasses the tools, techniques, and knowledge-based practices applied to projects to achieve organizational goals and deliver products or services (PMI, 2004). Moreover, project management involves practices based on tangible resources (e.g., concrete resources, explicit and codified knowledge) as well as intangible resources (e.g., tacit knowledge and knowledge-based resources) (DeFillippi and Arthur, 1998; Fernie, Green, Weller, and Newcombe, 2003).

The widespread figures on project failure rates and related cost overruns attests to the growing interest in the project management field (Standish-Group, 2003). The field increasingly focuses on project management methodologies, maturity models, and planning tools and techniques. Heightened attention to the subject is also evident by the adoption of project management offices by many organizations (Bounds, 1998; Ibbs and Kwak, 2000; PMI, 2004). Project management is an essential building block of business value, yet not all aspects of the discipline contribute to an organization's competitive advantage. It is imperative for organizations to assess which project management practices are most relevant to their business strategy. To guide readers in this assessment, the chapter explains a competitive advantage model supported by the theories of business strategy, which is applied to the project management field. We begin with an overview of the strategic management process.

18.3 STRATEGIC MANAGEMENT PROCESS

The strategic management process consists of the steps an organization undertakes to implement the productive function successfully. Figure 18.1 illustrates the process we will examine in this chapter.

Defining the organizational strategy starts with a clear elaboration of the firm's reason for existence, its *vision*. In defining its vision, an organization should carefully consider the socioeconomic functions it intends to fulfill. A clear and shared understanding of the vision is necessary so that shareholders and stakeholders understand what the organization intends to accomplish (Porter, 1996). The following list illustrates the vision statements of some well-known organizations:

Scotland Yard. Working together for a safer London.

Greenpeace. Greenpeace is an independent, campaigning organization that uses nonviolent, creative confrontation to expose global environmental problems, and force solutions for a green and peaceful future.

Microsoft. At Microsoft, our mission and values are to help people and business throughout the world realize their full potential.

HSBC Group. We are the world's local bank.

Toyota. By manufacturing cars that reflect the needs of customers and society, Toyota will target sustainable growth and contribute to the development of the automobile industry.

With a clear sense of purpose in mind, the organization defines the *vision* for its future. Now, the organization should consider the objectives, goals, or milestones it must pursue to fulfill its mandate, the organizational *mission*. For instance, in the company's annual report, Toyota's president, Katsuaki Watanabe, states that in order to move the company toward its vision, the mission is that "in the immediate future, we will focus on quality enhancement, further cost reductions, and personnel development" (Toyota, 2006, p. 9).

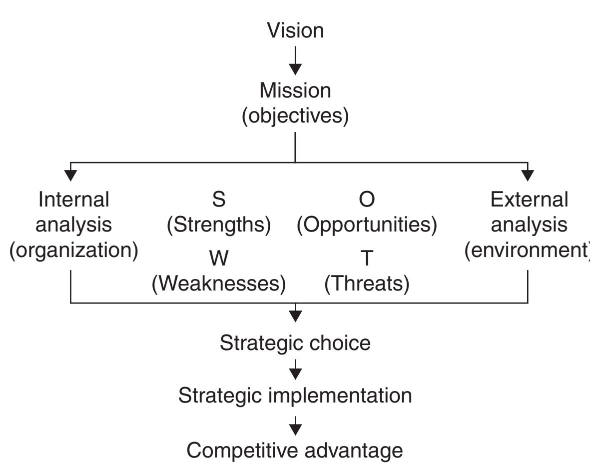

FIGURE 18.1 Strategic management process.

Following the vision and mission statements, an organization designs its strategies. In order to assess *strategic choices*, an organization conducts an analysis of the external and internal environments within which it operates.

18.3.1 Intended Versus Emergent Strategies

The traditional view on strategic management was that the strategy process centered on the decisions made by top management (Ansoff, 1965) who was responsible for the entire process. This outlook leads to a mechanistic and hierarchical approach where top executives define the organization's strategies and staff personnel implements them. The work of Henry Mintzberg and colleagues (Mintzberg et al., 1998; Mintzberg and Quinn, 1996; Quinn and Cameron, 1988) challenged this thinking. They state that strategy does not always take a top-down approach, and not all planned strategies materialize; some strategies simply emerge. Much of what organizations accomplish is not necessarily the result of top management's intended strategies. Strategy, therefore, becomes a pattern of organizational actions (Mintzberg et al., 1996) involving multiple players.

The more current view of the field acknowledges that strategies are strongly shaped by decisions emerging from all levels of the organizations. This expanded view of business strategy acknowledges that many of the realized organizational strategies follow an emergent process so that the strategic management process originates from within the ranks of the organization. This perspective requires a shift in thinking toward the viewpoint that goes beyond a top management *strategic planning* approach. Instead, all decision makers within the firm become strategy definers who incorporate *strategic thinking* in their everyday decisions. This more current perspective of strategic management also allows us to examine how project management can help shape organizational strategy. Specifically, project management becomes a:

- Process with which to implement intended, top-down strategies
- Source of new emergent strategies from the ranks of the organization
- Driver or enabler of the proper implementation of intended and emergent strategies toward organizational efficiency and effectiveness

Project management capabilities may guide and facilitate the strategic management process. Specifically, project management has the potential to become a source of competitive advantage. As an organization develops its project management capabilities, it could also develop better strategies and implement them more efficiently. If an organization masters these activities in ways superior to those practices used by competitors, it can attain a position of competitive advantage. Before discussing competitive advantage, we must understand the meaning of successful business strategies.

18.3.2 Above Average Performance for Different Markets

When shareholders attain higher returns than alternative investments at the same level of risk, it signifies that organizations are employing successful strategies. The ultimate goal of an organization's strategy is to generate returns higher than those of its competitors (Barney, 2002). The many indicators of stock performance, profitability, and economic value added measure the success or failure of organizational strategies. Usually, the concept of above average returns focuses on the economic profit to shareholders who control the financial capital used by the firm. This same concept can be extrapolated and applied to different returns to other stakeholders.

Organizations are accountable to more than their shareholders; they are also accountable to their stakeholders, from whom they may access environmental, human, technological, social, and other resources. Governments, unions, suppliers, and the general public also control resources and look to organizations to maximize returns not necessarily of a financial nature. Like shareholders, stakeholders weigh risks and returns and make available the resources to organizations that maximize returns. For instance, people (human resources) will maximize their utility by working for organizations that reward them in the best fashion possible; governments will grant mineral rights to the best possible bidders; and society will favor organizations that minimize their environmental footprint. Organizations should consider the many markets they operate in (e.g., capital market, labor market, and energy markets) and their key stakeholders so that they can assess the respective returns, relevant to each market.

The proportional return to each stakeholder is a critical factor because stakeholder interests differ. Organizations must therefore create a balance between return to capital for shareholders and other factors, including employees' wages, production growth and pollution minimization, and development and environmental impact. Project management is an important vehicle used to define and implement organizational strategies because project management focuses on time, cost, and scope priorities and the needs of diverse stakeholders. Furthermore, project management clearly uses an input-process-output model aligned with the productive function. In addition, the outputs of project management are product and service oriented.

An organization that enjoys above-average returns occupies a position of *competitive advantage* over its competitors. A competitive advantage results when an organization either *employs cheaper resources* or *produces higher value* through its productive functions, relative to competitors (Hunt, 2000). For example, the Energy Information Administration of the United States (2006) recently compared the capabilities of Saudi Arabia and Canada, two countries with the largest oil reserves in the world. Saudi Arabia has a core competence based on its above par resources, stemming from its enormous reserves of high quality and easily accessible oil (estimated at 264.3 billion barrels). Canada has a core competence based on how it produces higher value from its productive function. Historically, Canada faced technological limitations in recovering oil from the tar sands deposits in northern Alberta, and until recently, it was not a major player in the oil markets. Recent technological developments in oil sand extractions opened such reserves to 174.1 billion barrels of oil, second only to Saudi Arabia's reserves. The Saudi core competency results from resources more valuable than its competitors; the Canadian competitive advantage is driven by a capability superior to that of its counterparts. Both countries enjoy above-average returns in the oil industry when compared to other countries around the world.

The above analogy is useful for comparing many organizations around the world. Project management involves various resources applied to the production function to create services or products. Some companies may employ cheaper resources, while other companies may produce higher value through their project management productive functions. Attaining such a high level of performance requires that organizations make comprehensive assessments of the contexts in which they operate, as we introduce next.

18.4 CRAFTING WINNING STRATEGIES

The process of determining the right strategies involves a careful assessment of the external environment followed by an assessment of the internal resources and capabilities in the context of the marketplace analysis. This chapter does not delve deeply into various models available in strategy; instead, it illustrates a few managerial models to demonstrate that strategic management techniques overlap and complement project management techniques. Strategy and project management may then work in concert to create enterprises that are more competitive.

Readers may be familiar with the Strengths, Weaknesses, Opportunities, and Threats (SWOT) technique (Andrews, 1980). A SWOT analysis is a good high-level analysis that contributes to the understanding of the strategic analysis process. The SWOT analysis has been criticized, though, for being superficial and lacking content for strategic decision making (Dushkin/McGraw-Hill, 1997). It is a useful technique but also involves elements of arbitrariness. Better ways of conducting strategic analyses require deeper understandings of the internal and external contexts of organizations.

18.4.1 External Environment

An external environment assessment begins with a complete understanding of external factors that can affect economic activities, with a specific focus on those factors closely related to the company's business. Thus, managers should constantly monitor the demographic, economic, political, legal, ecological, sociocultural, and technological environments. Such an analysis is sometimes referred to as the DEPEST analysis.

Commonly, such analyses are imperfect models because implementing business strategies involves managerial biases. Social conformity, escalation of commitment, and narrow and localized cognition generate what Selznick (1957) called *bounded rationality*. In other terms, managers have limited ability to evaluate their environment with clear unbiased rationality. Social context limits the ability that managers have to make solid rational decisions.

Groupthink is one example of bounded rationality. *Groupthink* means that an individual may disagree with some of the group decisions yet may not challenge the collective decisions due to socialization forces inside the group. As a result, such a person suppresses individual preferences, even if the group's decision is not as good as the individual's decision. Project management techniques bring structure to such analyses and become instrumental in helping an organization understand the external environment more objectively.

Project management regularly incorporates external environment evaluations, especially in the context of stakeholder analyses as well as planning exercises to determine the project scope and risks. As a result, project management techniques can help organizations devise better strategies.

18.4.2 The Industry Structure: Porter's Five Forces

As strategists evaluate their external environment, they relate it to the specific industries and businesses they operate. Porter (1998) articulated an insightful industrial organization framework with his "five-force model." Figure 18.2 illustrates this model.

Industry specific profitability varies according to the conditions defined by the internal rivalry among direct competitors and the bargaining power of suppliers and customers. Industry profitability is also a consequence of how easily new competitors enter the same industries or of whether competitive substitutes exist for the products offered by the industry.

We now turn our attention to a more current business strategy perspective based on the Resource Base View (RBV) of the firm.

18.4.3 Internal Environment

The RBV offers a more powerful explanation of firm performance than those previously discussed. Moreover, the RBV may be the most promising venue for connecting projects to business strategy.

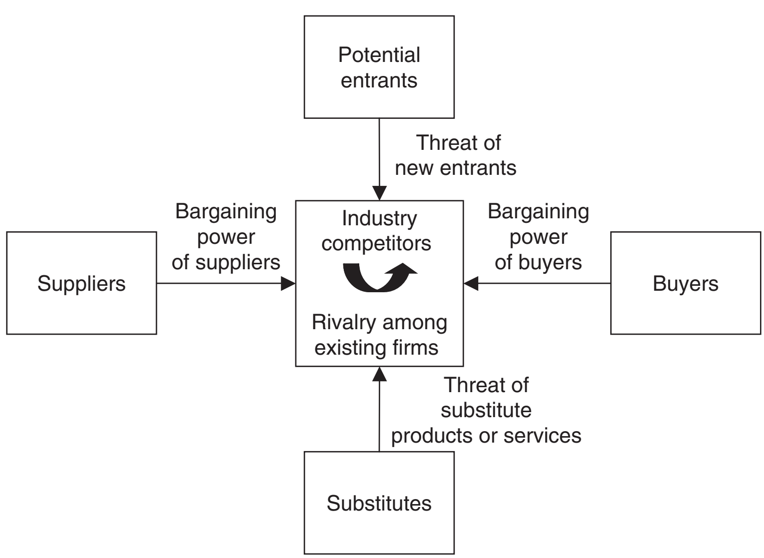

FIGURE 18.2 Porter five forces (as adapted from Porter, 1998).

Stemming from strategy and economics, the RBV examines competitive advantage in terms of a company's internal resources.

Such a stream of strategic thinking proposes that good organizational strategies depend on resources or capabilities that generate superior value to an organization's activities when compared to the resources and capabilities of their immediate competitors. Thus, resources or capabilities may become an organization's core competency, in other words, the drivers of the organization's above-average performance. This school of thought offers a framework that helps business professionals evaluate and understand the drivers of profitability of an organization, as explained next.

18.4.4 The VRIO Framework

Core competencies lead to above-average returns by being Valuable (provide economic value), Rare (unique), Inimitable (difficult to copy), and involving Organizational Support (management support, processes, and systems) (VRIO) (Barney, 1991). Within this framework, managers can ask these specific questions to assess the company's resources and capabilities:

- **Valuable:** Do a firm's resources and capabilities enable the firm to respond to environmental threats or opportunities? A resource has value when it exploits opportunities and neutralizes environmental threats.
- **Rare:** Is a resource currently controlled by only a small number of competing firms? Those resources not widely held by other organizations are rare.
- **Inimitable:** Do firms without a resource face a cost disadvantage in obtaining or developing it? Inimitability means organizations protect their resources so that competitors cannot easily copy them.
- **Organizational Support:** Are a firm's other policies and procedures organized to support the exploitation of its valuable, rare, and costly to imitate resources? Organizational support refers to integrated and aligned managerial practices, routines, and processes (*Barney, 2002, p. 161*).

Both value and rarity are required for a temporary competitive advantage. Value, rarity, and inimitability are required for a sustained competitive advantage (Barney, 1998), and, as a company transitions from competitive parity to a sustained competitive advantage, there is increasing evidence of organizational support. Figure 18.3 indicates that meeting various criteria in a coordinated manner has competitive implications.

With this overview, what are the aspects of project management that represent sources of competitive advantage?

Valuable?	Rare?	Difficult to imitate?	Supported by organization?	Competitive implications	Performance
No	-	-		Competitive disadvantage	Below normal
Yes	No	-		Competitive parity	Normal
Yes	Yes	No		Temporary competitive advantage	Above normal
Yes	Yes	Yes		Sustained competitive advantage	Above normal

FIGURE 18.3 VRIO framework (adapted from Barney, 1998).

18.5 PROJECT MANAGEMENT RESOURCES

Key tangible project management resources include project management methodologies, databases, software, tools, bodies of knowledge, textbooks, and project management offices. We begin with an overview of tangible resources and then focus on project management maturity models as a comprehensive way of assessing tangible project management resources with the VRIO framework.

Throughout the project, various tools, techniques, and technology are mechanisms that improve information and knowledge flow and assist with decision making. Such devices include information and knowledge management systems, executive decision tools, risk assessment tools, and computerized models and simulations (Besner and Hobbs, 2004). Some well-known examples of software tools are Microsoft Project or Primavera. Specific Project Management Methodologies provide guidelines and checklists to ensure that the practices evolve properly and that the company achieves the right outcomes, before it moves to the next step.

Worldwide, a number of project management associations support the discipline (e.g., Association of Project Management, Australian Institute of Project Management, Japan's Project Management Forum, and the Project Management Institute) (Morris, 2001). Bodies of knowledge have been assembled to guide practitioners; an example is the Project Management Institute's Project Management Body of Knowledge Guide (Project Management Institute, 2000). This body of knowledge provides explicit standards on the knowledge areas of time, cost, scope, quality, human resources, risk, communications, procurement, and integration (PMI, 2004). Project management books also represent codified knowledge and emphasize the rationalistic view of project management tools and techniques (Morris, 2001).

These days, more companies are establishing project management offices to coordinate the use of tools, techniques, and technology. Such tools support projects, ensure consistency of use, and provide training and guidance, particularly on troubled projects (Crawford, 2002; Kerzner, 2001). Project management offices may also provide the project management methodology and specific project templates, conduct project audits, and even serve as a reporting mechanism (Rad and Levin, 2002). These offices reflect a coordinated and structured way of implementing tangible project management practices; a key function of a project management office is to communicate information. Since most project management offices play a coordinating and auditing role, they assume many responsibilities but enjoy little formal authority. A project management office functions essentially as a process support mechanism.

18.5.1 Assessing Project Management Resources with the VRIO Framework

In this section, we elaborate if project management may lead to organizational competitive advantage. We do so as we employ the previously discussed VRIO framework to evaluate project management capabilities. In detail, we explore how and if the maturity models (as a proxy for tangible project management resources) may lead organizations to above-average performance.

Maturity Model Overview. Over the past decade, maturity models have emerged in the literature as concrete ways of assessing a firm's project management practices. The models are gaining interest as companies and academics strive to make sense of why some projects succeed and others do not, as they try to understand the returns from an investment in project management. Proponents claim that the maturity models enable firms to achieve a competitive advantage.

The maturity levels portray a firm's evolution from immature project management practices to more evolved practices, with the related infrastructure in place to support projects at the organizational level (Dinsmore, 1998; Kerzner, 2001). Most models provide structured objective criteria linked to each level of maturity. Typically, project management maturity models follow national project management bodies of knowledge. Companies can assess their project management maturity level with surveys. The questions are based on a Likert scale and focus on the project management knowledge areas. For example, a question on the cost control process asks participants to check off one level; the anchors of this question are the following:

- **Level 1:** Project teams are applying their own approach to managing and controlling costs; cost changes are unequally managed.
- **Level 5:** An improvement process is in place to improve continuously the cost control process; lessons learned are captured and used to improve the monitoring and control efforts" *(Pennypacker, 2001, p. 9–10).*

Project management maturity models derive from the Software Engineering Institute's Capability Maturity Models, and they assess practices against standard criteria (Carnegie-Mellon, 2002). Model variations generally involve five linear stages:

> **Level 1—Initial Process:** Although there is recognition that there are project management processes, there are no established practices or standards, and individual project managers are not held to specific accountability by any process standards. Documentation is loose and ad hoc. Management understands the definition of projects, there are accepted processes, and is aware of the need for project management. Metrics are informally collected on an ad-hoc basis.
>
> **Level 2—Repeatable Process:** Many project management processes exist in the organization, but they are not considered an organizational standard. Documentation exists on these basic processes. Management supports the implementation of project management, but there is neither a consistent understanding, involvement, nor organizational mandate to comply with for all projects. Functional management is involved in the project management of larger, more visible projects, and these are typically executed in a systematic fashion. There are basic metrics to track project cost, schedule, and technical performance, although data may be collected /correlated manually. Information available for managing the project is often a mix between summary level data and detailed level data.
>
> **Level 3—Refined Process:** All project management processes are in place and established as organization standards. These processes involve the clients as active and integral members of the project team. Nearly all projects use these processes with minimal exception—management has institutionalized the processes and standards with formal documentation existing on all processes and standards. Management is regularly involved in input and approval of key decisions and documents and in key project issues. The project management processes are typically automated. Each project is evaluated and managed in light of other projects.
>
> **Level 4—Managed Process:** Projects are managed with consideration to how the project performed in the past and what is expected for the future. Management uses efficiency and effectiveness metrics to make decisions regarding the project and understands the impacts on other projects. All projects, changes, and issues are evaluated based upon metrics from cost estimates, baseline estimates, and earned value. Project information is integrated with other corporate systems to optimize business decisions. Processes and standards are documented and in place to support the practice of using such metrics to make project decisions. Management clearly understands its role in the project management process and executes it well, managing at the right level, and clearly differentiating management styles and project management requirements for different sizes/complexities of projects. Project management processes and standards are integrated with other corporate processes and systems.
>
> **Level 5—Optimized Process:** Processes are in place and actively used to improve project management activities. Lessons learned are regularly examined and used to improve project management processes, standards, and documentation. Management and the organization are not only focused on effectively managing projects but also on continuous improvement. The metrics collected during project execution are used to understand the performance of not only a project but also for making organizational management decisions for the future. (*Pennypacker, 2001, p. 3*)

Project management maturity models identify strengths and weaknesses. In addition, most focus on incremental quality improvement practices. Most companies are at Level 1 or Level 2 (Pennypacker, 2001). The models heighten awareness on best practices according to the body of knowledge, and they provide companies with a snapshot of current practices against project standards. The growing emphasis on maturity models also reflects an increasing desire to link project management competency to corporate achievements (Cooke-Davies, 2002). However, there are some criticisms of the project management maturity models (Cabanis, 1998; Kujala and Artto, 2000), including these:

- Models are inflexible when a flexible model is required for managing change and in keeping with quality improvement principles.
- Maturity models lead projects toward identifying problem and raising awareness but not solving problems. The firm must develop a plan, implement, control, and adjust it.
- The models do not account for the rapid pace of change with which firms adopt new technology and change processes, practices, management systems, or policies.
- The five maturity levels do not offer enough granularities to measure progress over time.
- Models are overly disciplinary, impractical, and overwhelming as methodologies.
- Models focus on the work processes and ignore the human resource or organizational aspects.

Project management maturity models focus on codified and documented practices yet ignore the company's intangible resources. In addition, no one model has achieved acceptance at a worldwide level. Some of the project management maturity model literature is misleading because it purports to offer a competitive advantage but does not define competitive advantage under project management terms (Hartman and Skulmoski, 1998; Pennypacker, 2001). In the next section, we use the VRIO Framework to assess the tangible project management resources with the maturity models as a proxy for these resources.

18.5.2 Applying the VRIO Framework to Project Management Maturity Models

In the VRIO framework the first question asks if the resources are valuable. Project management maturity model worth is evident, in part, when companies invest in such tools. For example, they purchase the survey material and conduct maturity assessments, pay consultant and software licensing fees, and provide staff training. The literature indicates that the contribution of the maturity models is evident in some efficiency and financial metrics, denoting that firms with higher levels of maturity perform better and achieve more savings than those with lower maturity scores (Ibbs et al., 2000).

The second question of the VRIO framework asks if the resources are rare. Although project management maturity models are usually heterogeneously distributed because not all firms use them, they are widely available and accessible. These maturity models also face a substitution threat, as customers have choices and can select the one they want to use.

The third question asks whether the resources are difficult to copy. The lack of protective mechanisms indicates that project management maturity models do not offer an enigmatic ambiguity or social complexity protecting them from competing firms. In fact, the ability to imitate is a feature that vendors highlight when they state that their models result from best practice databases. Project management maturity models involve codified knowledge that makes them transferable between firms. The knowledge that staff gains from using the models is readily transferable to other firms. For instance, the utilization of enterprise resource planning (ERP) software is unquestionably a source of efficiency and profitability for organizations. However, the widespread utilization of such systems will not move an organization ahead of its competitors if all opponents commonly use ERP software.

Although project management maturity models have merit, according to the VRIO framework (Figure 18.3), the models are valuable and involve a degree of organizational support, but such models are neither rare nor difficult to copy (inimitable). At best then, project management maturity models lead to competitive parity. Project management maturity models do not lead to sustained competitive advantages, as the literature purports (Hartman et al., 1998; Pennypacker, 2001; Schlichter, 1999). In addition, as these models do not draw from the economic or strategic literature on competitive advantage, the arguments put forth toward "winning in the marketplace" with such models are weak at best.

If project management maturity models are not the "silver bullets" they are depicted to be, then where might the actual sources of competitive advantage from the discipline stem from? To examine this issue we suggest that the focus should turn to the knowledge-based resources of project management or the less visible, intangible resources such as those found within communities of practice, tacit knowledge, and social capital.

Earlier we discussed project management maturity models as a proxy for assessing tangible resources within companies. However, project management consists of tangible *and* intangible resources. Some examples of intangible resources include communities of practice, tacit knowledge sharing practices, and social capital exchange practices. Ways in which project managers demonstrate their tacit knowledge include mentoring, showing others how they use tools or techniques.

Collectively held knowledge evokes the concept of communities of practice (Brown and Duguid, 1998; Wenger, 1998). In project management, a community of practice is defined as a group in which "members regularly engage in sharing and learning, based on their common interests" (Lesser, 2000, p. 831). Communities of practice involve the informal exchange of ideas, practices, tools, and techniques. However, the practice is not widespread.

As knowledge flows through social networks that connect people (Currie, 2003), a community of practice represents an engine for developing social capital (Lesser, 2000). Social capital is based on making connections with others, promoting durable networks, enabling trust, and fostering cooperation (Prusak and Cohen, 2002). Social capital is an intangible attribute of the relationships among members of a social unit (Portes, 1998) and thus another intangible resource in project management.

Communities of practice, social capital, and tacit knowledge may not be widely supported because companies tend to view the competitive advantage of project management as embedded in the visible and tangible resources. We suggest that the intangible resources may be the true sources of competitive advantage in project management because they are knowledge-based and involve ambiguity. Those characteristics make them difficult for rivals to copy.

Figure 18.4 summarizes the paradox surrounding the discussion of project management maturity models and the need for intangible project management capabilities. The development of project management as a core competency (e.g., the ability of a firm attaining above-average returns in a sustainable way due to project management capabilities) will occur only if an organization develops two facets of project management assets, know-what and know-how. Project management know-what means that an organization is well acquainted with project management tools and techniques; it controls the technology for using the best practices in the field. In this figure, we use project management maturity as a way of assessing know-what. Yet, the know-how side must be embedded in the "way of doing things" of the organization. It should be part of the organizational culture and its tacit organizational knowledge. The social networks of the organization embrace the project management techniques as a part of the whole entity.

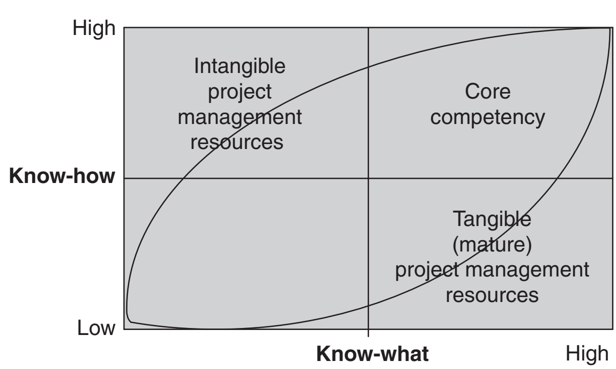

FIGURE 18.4 Project management as a driver of organizational core competency.

18.6 PROJECT MANAGEMENT AS A CORE COMPETENCE

We propose the matrix illustrated in Figure 18.5 to help readers understand how project management practices can help companies achieve a core rigidity, dynamic capability, core competence, or sustainable competitive advantage.

The x-axis represents degrees of project management capability based on tangible to intangible resources. Recall that tangible resources can be valuable and involve organizational support, but these resources are not necessarily rare and they can be easily copied. In contrast, intangible resources have the potential to be rare and can be difficult to copy. On the y-axis we show projects that are either incremental in nature or unprecedented. Incremental projects are repeatable, based on existing practices, and reflect the existing ways of work that frequently use the same or similar processes. Unprecedented projects are unique in terms of the processes used and the outcomes achieved.

Companies in Quadrant I have a higher degree of project management maturity but little or no creativity or flexibility, since their intangible project management assets are not well developed. These conditions lead to core rigidities. In other words, previous capabilities are now inappropriate sets of knowledge that are difficult to change and inhibit development, primarily because companies in Quadrant I depend on their tangible resources predominantly.

Companies in Quadrant II also have well-developed intangible project management resources; therefore, they rapidly create new core competences. Such organizations have the ability of developing new core competencies in the future and use project management capabilities for doing so, as they can see problems with new perspectives. In strategy terms, organizations in this quadrant have dynamic capabilities or the ability of developing new core competencies. Quadrant II organizations are the ones most sustainable in terms of competitive advantage because they capitalize on their intangible (knowledge-based) resources (e.g., tacit knowledge, social capital, and communities of practice) to develop new products and services.

Companies in Quadrant III may well have the adequate maturity levels as they focus only on their tangible resources. These companies may have core competences, but the competences are not sustainable. These companies use their traditional processes when it comes to the production function and project management practices.

Organizations in Quadrant IV capitalize on their intangible resources and complete projects involving incremental improvements. These companies are more capable of sustaining such advantages because competitors will have a hard time copying their intangible resources. Yet, they face challenges in using their project management to be innovative and creative.

For illustrative purposes, let us compare two well-known technology companies, Microsoft and Google. It seems reasonable to assume that Microsoft has a more traditional, documented, and

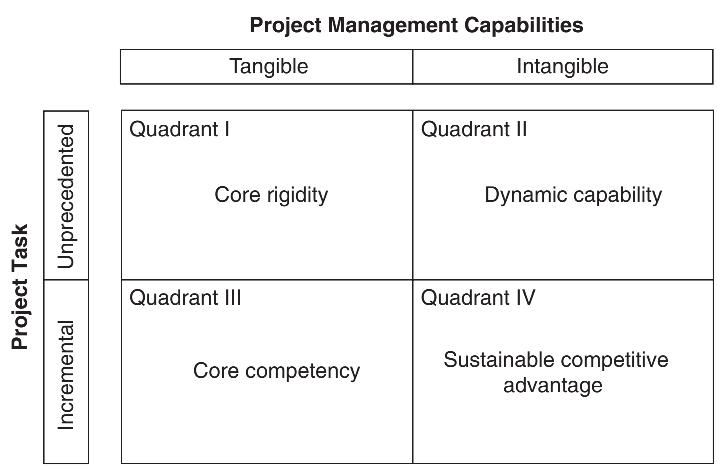

FIGURE 18.5 Project management strategic matrix.

regimented project management process stemming from its long-standing tangible project management resources. This seems evident from its historical ability to develop and market software products, with each version building on the features of the previous one. Alternatively, Google (a much younger company) appears to be more organic as well as innovative and creative. As evident from the dynamic online Web sites, Google appears to use its internal tacit knowledge as a foundation for project management.

Exemplifying Quadrant III in Figure 18.5, Microsoft seems quite successful in defending its market position when it comes to projects that are incremental in nature. The "ways of doing things" for Microsoft have been a major source of competitive advantage to get the company to the place it currently occupies in established markets. Microsoft uses its existing project processes and defends its core business with its abundant financial resources and monopoly. Yet competitors constantly challenge Microsoft because many core competencies are not that hard to copy. Google challenges Microsoft's position in the Internet space; SAP defies Microsoft's position in the enterprise software space; Apple disputes the dominance for music players with its iPod; and Mozzila's Thunderbird dares to capture a big portion of the browser segment.

On the other hand, exemplifying Quadrant IV, Google has developed a more sustainable position in the search engine market. The company employs intangible project management resources for its search engine technology and pay-for-click revenue streams. However, Microsoft struggles to initiate new projects and fails to create new services or products in the search engine (controlled by Google) and music player domains (dominated by Apple). When Microsoft ventures into new markets, it uses the same cadre of processes supported by tangible project management capabilities (Quadrant I). As a result, the company fails to win market share; it has core rigidities and is not flexible and nimble enough to enter new segments in the software and Internet environments.

Google's intangible capabilities appear to help the organization develop new markets and create new capabilities (Quadrant II); as explained above, the ability of creating new core competencies is referred to as dynamic capabilities. Flexible and intangible project management capabilities become drivers of creation of new capabilities. The company is successfully integrating video blogging (via YouTube) in its "pay-per-click" revenue stream. The company is also advanced in offering free Internet-based text editors and spreadsheets (http://docs.google.com/). Google's intangible project management capabilities have helped the organization develop unprecedented projects and create new core competencies. Google is probably the strongest challenger Microsoft faces. This is an ongoing fight, but Google has changed the rules of engagement in the Internet battle.

18.7 CONCLUSION

An understanding, developing, and sustaining core competence is central to long-term organizational survival and growth (Porter, 1991). We take the overview of the strategic management process, concepts on above-average performance, the ways that companies craft winning strategies, and the strategic frameworks used to assess tangible and intangible project management resources and capabilities. With this perspective, we propose the following five guidelines for readers to consider.

First, we encourage readers to conduct their strategic management process in an inclusive manner by engaging those involved in decision making at all levels of their organization. It is important to note that not all deliberate strategies will materialize, and emergent strategies are sometimes the ones that a company focuses on. When this happens, it helps to have an open mind to such strategies and view them as opportunities rather than a reason to pull in the reins and focus only on the deliberate strategies.

Second, we encourage readers to consider tools and techniques for the strategic management process with a critical eye. The SWOT analysis may not provide a full or deep enough external environment analysis, but supplementing the SWOT analysis with a DEPEST analysis and a Porter's Five Forces analysis will help provide a more complete picture to help craft winning strategies.

Third, we hope that readers will try the VRIO framework and apply it to their company's resources and capabilities in an objective manner. A key strength of the VRIO framework is that it takes a balanced approach to tangible and intangible resources and capabilities and allows participants to assess a degree of competitive advantage.

Fourth, we trust that this chapter has helped raise awareness on the importance of intangible resources. Although intangible resources are similar to the part of an iceberg submerged underwater, they are very important. We have all heard that "people are our most valuable resources"; the RBV helps companies practice what they preach.

Finally, many companies practice project management but few truly see the discipline as being related to their strategic management process. Project management uses an input-process-output model and a variety of tools and techniques, which can be useful for the strategic management process. We encourage readers to think of project management as a discipline, which, although primarily conducted at the operational levels of the organization, has merit at the executive levels as well.

To conclude, if companies focus mainly on tangible project management resources, such as those measured by project management maturity models, they may achieve competitive parity but miss capitalizing on their true sources of competitive advantage—intangible resources.

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CHAPTER 19
PMO CREATION WITHIN FINANCIAL SERVICES COMPANIES

Robert Chaves

Robert Chaves is a seasoned project management professional with over 12 years experience managing a diverse portfolio of projects for financial services and banking firms throughout the Americas. Most recently, Mr. Chaves has been employed by Fifth Third Bancorp, a super regional bank with over 1,000 branches throughout the Midwest and Florida where he fills the role of director of the bank's project management office. As PMO director, Mr. Chaves has oversight of all bank project and program initiatives. Fifth Third's PMO provides project and quality methodology and oversight for all Bancorp projects and over 100 project management staff.

Prior to joining Fifth Third, Mr. Chaves founded several off-balance sheet financial services companies, later consolidated under the Finex Trade Group umbrella. Finex Trade group represents the United States Export Import Bank (EXIM Bank) and provides structured trade finance and logistics management for U.S. exporters worldwide. Mr. Chaves led several company divisions and ended his tenure with the company as VP of Strategy where among other things he created and oversaw Finex's project management office.

Mr. Chaves holds a bachelor of arts from the University of Illinois and an MBA from the Universidad Internacional de las Americas (San Jose, Costa Rica). He is a certified Six Sigma Black Belt from the American Society for Quality as well as a project management professional from the Project Management Institute (PMI) and holds several Microsoft certifications including an MCSE (Microsoft Certified Systems Engineer). He is active in professional organizations including PMI where he sits in the board of advisors for the Southwest Ohio Chapter as well as the National Society of Hispanic MBAs where he holds a seat in the board of directors of the Greater Cincinnati Chapter.

19.1 INTRODUCTION

Much has been written on the topic of project management. Authors have traditionally focused on the management process itself, detailing how methodologies interact with controls and how project managers use their soft and hard skills at different points in the project life cycle to move the project forward. The project management institute has created an entire body of knowledge devoted to this very thing, yet little information is found in the actual process or mechanics behind the establishment of the project management office (PMO) itself. This chapter will attempt to contribute in a small way to filling in this important gap.

What follows is a brief recap of the author's experiences in creating and running project management offices over the last 10 years. While the author's background is primarily within the financial services and banking industries, most of these lessons will be applicable to a host of industries from manufacturing to health care and many in between.

We have all read the sobering statistics related to PMO creation success or lack of success. The majority of projects launched under the best of circumstances will run into varying degrees of difficulty throughout their life cycle. Experience has shown that some fairly standard milestones will usually mark the creation phase of a PMO, which may take anywhere from 6 to 36 months to mature depending on the environmental complexity. While nuanced by the company or industry, the high-level themes or milestones are usually:

- A marked genesis point or period in some cases that triggers the creation of the office.
- This genesis trigger will oftentimes be followed by the engagement of a team, sometimes internal but usually external in the form of a consulting company engaged to create the methodology, governance mechanisms, and controls.
- Not knowing what to control, every metric, every process, every document will seem vital, and the governance aspect of the PMO will grow, swinging the control pendulum from the operational center to the dysfunctional right. This will promote within the company ranks the association of the PMO with overhead and paperwork. There is usually a sacrificial lamb at this juncture, usually the PMO director or the consulting company.
- There is little value associated with overburdening paperwork so at this point, the entire PMO is either scrapped or a new PMO head is appointed. Now with the benefit of knowing what not to do, the PMO's focus is shifted from the tactical to the strategic, and a renewed look at control functions and processes is undertaken, bringing the pendulum back to center. The methodology and controls are modified to meet the reality of the company, its culture, and maturity, not necessarily best practices which may be hard for the company to reach at this point.
- With a renewed look inward the PMO's focus shifts from governance to partnering with its internal clients, and its value proposition starts to be felt. Small project wins help solidify the PMO's contribution, and project management begins to be socialized within the organization. The realization that project management is a well-defined skill, or rather the grouping of many skills, sets in, and the professionalization of project management begins as PM work stops being assigned to any available resource.
- With sufficient credibility the PMO starts down the portfolio management journey that culminates in the PMO moving from a transactional PM bench to a trusted partner with a seat at the executive table where plans for strategy execution are conceived.

Figure 19.1 summarizes the interative process of moving from a starting point of rigorous governance to portfolio management.

It is important to note that PMO creation is at its core a large change management effort, and like many newly introduced changes, it oftentimes requires several iterative refinements before the change is socialized into the company culture. PMO iterations should thus not be seen as failures but rather refinements to the department's components, be those personnel, processes, standards, organizational structures, and so forth. Entire books could be written detailing the aforementioned PMO creation cycle, so in the interest of brevity, the following chapter sections will highlight some of the more pertinent concepts which when properly implemented, may reduce the number of costly iterations.

19.2 GENESIS

The creation of a project management office can usually be traced to one of two primary drivers: first, an internal pull typified by the realization that standardization brings about efficiencies and consistent results or second, an external push by a third party such as a large client or regulatory agency which demands the creation of a PMO as a requisite for maintaining the relationship in good standing. While the resulting PMO office will tend to look and function in very similar ways regardless of its genesis drivers, the process of building the office and integrating it into the corporate culture will vary dramatically.

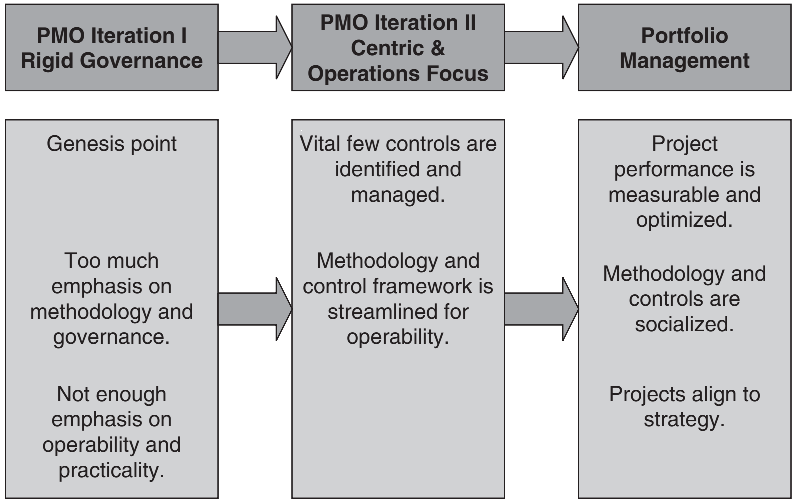

FIGURE 19.1 PMO iterative process to move to portfolio management.

19.2.1 Internal Pull

The PMO will oftentimes change or at a minimum formalize the way daily business is done. The level of effectiveness in managing this change will have a direct impact on whether the office is seen as overhead or as a facilitator of processes resulting in higher levels of quality. As such, offices resulting from the internal identification of needed structure brought on by a PMO will tend to be easier to implement than those pushed from the outside. We simply tend to accept change better when we are active participants in the change decision than when change is mandated upon us.

As companies grow, they tend to go through paradigm shifts as new environmental forces make the ad hoc way of doing business of yesterday ineffective for today's heightened market demands. Well-defined processes, standards, and controls tend to aid companies make the leap required to operate in today's more demanding paradigm. Familiarity with software development life cycle (SDLC) concepts together with ever increasing complexity and interdependency of technology applications have made organic creation of PMO offices commonplace within IT departments. Mature IT departments recognize process rigor as an effective way to limit risk and rework costs, combined with increased time-to-market efficiencies in application development. While the organic nature of the creation process is more apt to portray the PMO as a valuable partner easily socialized within the corporate culture, it is by no means a panacea for managing the implicit change to come. Upper management support will be a key ingredient needing to be carefully mixed with the existing grass roots effort, especially as the PMO extends its influence outside of its department of origin into other areas of the company.

A key component of successful organic PMO creation is early, clear definition of the PMO's contribution to the corporate value stream. Grass roots desire will likely not be enough to fund what oftentimes is a multiyear effort with elusive hard-dollar benefits. The challenge for many PMOs is that they facilitate the success (a soft-dollar action) of departments that can directly trace revenue generation, shining the spotlight on the hard-dollar creator while oftentimes overlooking the PMO's contribution.

19.2.2 External Push

Public companies will often be faced with compliance requirements dictating a balanced mix of automated, preventative, or detective controls. Sarbanes-Oxley legislation now requires corporate officers to attest to these controls on a quarterly basis. PMOs are seen as an excellent preventative control, oftentimes based on Control Objectives for IT (COBIT[1]) standards. This increased control requirement has resulted in various government agencies dictating the creation of PMO offices to corporations under their oversight.

Large clients dealing with smaller suppliers for whom the purchasing client is often a significant portion of the company's gross revenues are sometimes forced to adopt international standards in order to maintain the vendor relationship. Standards such as Capability Maturity Model Integration (CMMI),[2] ISO,[3] or other quality certifications are likely achieved at least in part by the creation of a PMO.

While the value of the PMO in external push cases is more easily identifiable as it becomes a prerequisite to maintaining some valuable relationship in good standing, identifying and communicating the PMO's own value proposition remains an important priority. It is important to note that in these cases the initial value of the PMO is really dependent on external factors, which may cease to exist, putting the necessity of a PMO in question if its contributions are not easily discernable.

19.3 MISSION

A primary step in the identification and communication of the PMO's value proposition, regardless of its genesis, is the early definition of the PMO's mission. Traditionally, the scope of that mission has been limited to four primary components: methodology; governance and control; PM training, education, and career pathing; and portfolio optimization (see Figure 19.2).

Furthermore, proper execution of planned activities within each of the four primary areas of focus will progress the organization through a maturity curve encompassing coaching to financial advisor roles (see Figure 19.3).

The maturity curve from the PMO Executive Council[4] is a good representation of the four primary roles that a traditional PMO goes through as it moves from a transactional project management oversight body to the more valuable partner/advisor role with its client base.

The first stage (coaching) deals with the obvious definition of project management processes, which are usually referred to as the project management methodology. Successful PMO's graduate from this role once the methodology is adopted and a large majority of all projects comply with PMO processes and standards. From coaching, PMOs move to auditors as emphasis is no longer on methodology socialization but rather the results of its proper use. Project quality is increased as failure rates decrease through mechanical auditing techniques such as midlife or tollgate reviews.

Methodology	**PM Training, Education & Career Pathing**
• Develop or modify the project management methodology.	• Create and deliver project management and business specific training. • Professionalize project management and make it a viable company career path.
Governance & Control	**Portfolio Optimization**
• Develop and actively manage the project control framework. • Meet regulatory requirements.	• Wisely assign finite resources to existing and future projects to maximize investment return.

FIGURE 19.2 Four primary components of the PMO's mission.

[1] COBIT: A framework of IT best practices developed by Information Systems Audit and Control Association (ISACA) and the IT Governance Institute in 1992. It is now in its fourth version.

[2] CMMI: Capability Maturity Model Integration. http://www.sei.cmu.edu/cmmi/.

[3] ISO: International Standards Organization. http://www.iso.org/iso/en/ISOOnline.frontpage.

[4] PMO Executive Council, a division of Corporate Executive Board. Washington, DC. https://www.pmo.executiveboard.com.

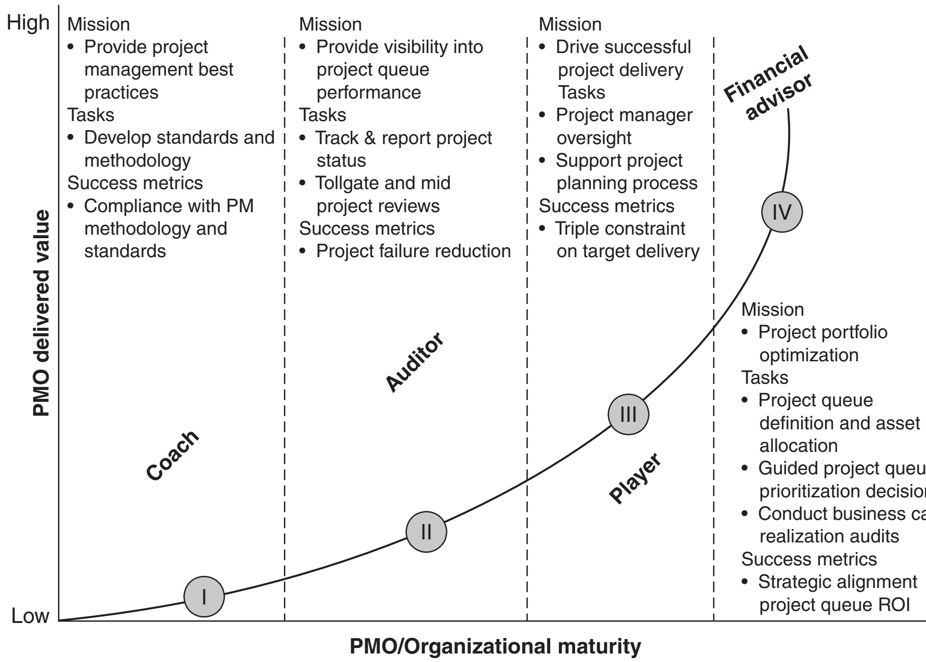

FIGURE 19.3 PMO/Organizational maturity growth and value.

With project performance visible to management, the PMO can now move to the player role through active management of triple constraint factors (cost, time, scope). The maturity curve ends with the financial advisor role where the emphasis is placed in management and oversight of the project portfolio. At this stage, the PMO interacts seamlessly with line of business verticals as well as enterprise departments, such as finance, infrastructure, and shared services.

19.4 ORGANIZATIONAL DESIGN

With the PMO's mission clearly defined, it's now time to shift our attention to the office's organizational design. The objective here is to provide clarity on who will be involved, where will the office be placed within the overall corporate structure, and what structure will the office take, which will depend on several environmental factors.

19.4.1 Who—Staff

A key point in the office creation process will be the proper staffing of personnel. There will be two possible candidate pools to draw from, internal company personnel and external resources. Both pools come with pros and cons. Qualified external candidates will bring with them a history of professional project management at the expense of company knowledge and organizational awareness found in their internal counterparts. Their specialized knowledge of the PM subject matter, however, may compensate for the learning curve that they will have to go through in terms of company specific knowledge and also provide the added benefit of setting the bar that internal candidates will have to negotiate if they want to transition into the PMO. The importance of correctly staffing the PMO office from the start cannot be overstressed. The right candidates must have a deep understanding of project management as well as broad business acumen affording them the ability to take a pragmatic approach to methodology development, roll out, and socialization. Only through a common-sense approach to project management from the PMO's origins will the audience not see this inherent change management process as unwanted overhead.

Internal candidates will have company knowledge and an established network to draw upon during project execution. Unfortunately, internal candidates will likely not have project management expertise, especially if the PMO is a brand new department to the company, so while the candidates may be well-known and respected, introducing incumbents into the PMO may not further the important aspect of socializing project management as a professional career track since giving these resources the PM title will further the impression that anyone can be a project manager. This may have a downstream negative impact on methodology adoption, as project management will not be taken seriously. An ideal mix is a combination of internal and external resources with an external candidate usually filling the PMO director position with the requisite deep PM knowledge not likely to exist within the organization and a mix of internal and external lieutenants under the director executing the director's vision.

To address this problem, the PMO must make project management a viable career choice through the creation of a clearly defined company career path. The PMO must work closely with the human resource department to create well-defined PM positions that can then be placed within a progressive multilevel hierarchy requiring increasing levels of proficiency in categories such as these:

1. Cost and benefit management
2. Risk management
3. Organizational management
4. Complexity management.

Let's clarify this point with a short example.

Projects may be classified within each of the previously listed four categories, with each category having criteria set for each level within the category. Let's take cost and benefit management for instance and assume a three-level design with

- Level 1 = Projects with overall cost between $1 and $250,000
- Level 2 = Projects with overall cost between $250,001 and $750,000
- Level 3 = Project with overall cost of $750,001 and above

The PMO, in conjunction with HR, develops three positions for PMs, levels 1 through 3 and then assigns projects whose profiles closely match the position requirements to individual PMs. An on-the-job career ladder will then specify a set number of similarly profiled projects that each PM must successfully complete in order to be eligible to move from one level to another.

The juxtaposition of segments of the overall course curriculum, together with the aforementioned career ladder, results in a framework for project management development that is traceable, measurable, and when tied to variable compensation, can align individual performance to project execution providing great incentives for the successful management of any project.

19.4.2 Where—Organizational Placement

Organizational placement of the PMO office will have a direct impact in the scope and influence the office it will manage. PMO Executive Council data reveals that the majority of PMOs trace their origins to the IT line of business with a small percentage reporting through various functional areas outside of IT. When deciding where to place a PMO, it is important to begin with the end in mind. If the PMO's mandate is technology oversight, then placement somewhere within the Chief Information Officer (CIO) organization is warranted. If the end state goal is to promote process discipline throughout the organization, not just IT, then placement within the Chief Operations Officer (COO) vertical is best.

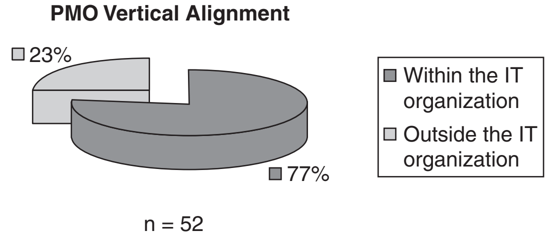

FIGURE 19.4 PMO vertical alignment with IT department. (*Source:* PMO Executive Council)

The most likely scenario, however, is that project management will start within the IT organization given its propensity for life cycle management brought on by the commoditization of software development life cycles. Once mature and through the direct contact between IT and the business, project management tends to migrate toward business lines. The problem with the migration from IT to business lines is that project management must then overcome the stigma of being a technology process rather than a business process. See Figure 19.4 for the functional alignment of the PMO and the IT departments.

19.4.3 What—Departmental Design

A related decision point to organizational placement is departmental design. There are several flavors of PMOs, and each brings with it challenges and opportunities. The most basic design considerations relate to centralized versus decentralized management.

Centralized office design, traditionally considered to be a project management office or PMO, is characterized by having all company project managers report to the PMO through a solid line relationship. This design is especially useful for smaller, less mature (from a process definition perspective) companies. Centralized management provides the PMO direct authority over the PM staff and significant influence over developmental and business analysis staff in other functional areas as the PMO directly controls a key member of the project team, the project manager. Along with greater control, the PMO unfortunately inherits greater responsibility for the overall portfolio queue performance, as the PMO must accurately staff its office to respond to changing portfolio demands, placing great importance on resource management, which may be difficult in less mature organizations.

A decentralized model, sometimes referred to as a project support office (PSO) or federated office model, is characterized by having the PM staff report directly to functional areas with dotted line reporting relationships existing to the PMO in some cases. Decentralized models are especially useful in large complex matrixed organizations with payrolls frequently surpassing five thousand employees. PSO models require a high level of maturity to be very effective, as the PMO will not have direct authority over staff but rather have to move its agenda through influence and relationship management. The lack of authority makes change management a slower process and is thus suited for more mature organizations. Organizational design of large-scale change, such as implementing a career track for project management, is a complex endeavor under this model, as buy-in for PM competency definitions, for instance, must be obtained before the model may be turned over to human resources for implementation. A positive aspect of this model, however, lies in the shifting of resource management responsibilities to the lines of business so that the PSO can concentrate completely on best practice definition through the creation of a center of excellence.

The project office will likely begin as a centralized office early in its maturity curve and transition into a decentralized support office as its mandate shifts from a coaching role to more of a financial advisor role. A survey by the PMO Executive Council points to such a shift as executives are asked to contemplate their current role versus their projected role as the project office matures. Figure 19.5 constrasts today’s mission to tomorrow’s goals.

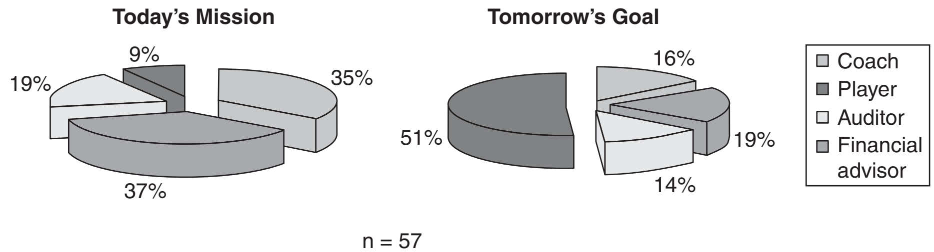

FIGURE 19.5 Changing roles of PMOs over time. (*Source:* PMO Executive Council)

19.5 BRICKS AND MORTAR

A company needs to be incorporated in order to provide a legal framework through which to operate, and in similar fashion a PMO department needs that same level of formality in order to become a recognized entity within the company culture. The next sections will briefly cover the major components that give the office that level of formality on which to build—the bricks and mortar, if you will.

Charter the Office. PMOs derive their authority from a departmental charter. It is that department's incorporation papers of sorts. It is through the charter that the department gains formal authority and recognition within the company's organizational structure. It should be obvious then that the charter should be signed by the highest executive possible—usually the Chief Information Officer, Chief Operations Officer or Chief Financial Officer, depending on the departments reporting structure.

While there is no standard departmental charter template to follow, there are a few key sections in every good charter:

- Departmental mission
- Organizational context
- Scope of authority & service

Fifth Third Bank's departmental charter is included next for reference.

Project Management Office
Departmental Charter

Mission

To create and continuously improve management frameworks for these areas:

- Methodology
- Tools
- Quality
- Business Analytics
- Project & Portfolio Management

These frameworks will be based on the following:

- Compliance Requirements
- Industry Best Practices

To monitor and influence adoption and use of the aforementioned frameworks through the following activities:

- Establishing relationships with our customers
- Providing education, training, and coaching
- Streamlining communications throughout our sphere
- Delivering value

Guiding Principles

Ensure that we deliver value to our customers by following a consistent repeatable methodology to deliver business solutions. The PMO will evangelize a structured methodology that enables project success by providing a consistent approach to the following:

- Customer focus
- Scope
- Schedule
- Budget
- Quality
- Resources

The PMO shall, within the first quarter of every year establish minimum acceptable project management standards and practices designed to assure compliance with changing government regulations.

The PMO will strive to institutionalize project management best practices while assuring strict adherence to acceptable practices.

Project management and quality frameworks will be developed using current business processes as their base aiming to modify those processes as little as necessary to assure compliance with acceptable standards. Frameworks will be based on operability and thus strive to balance the requirement to be "lean" while providing meaningful direction for the project team.

Organizational Context and Functional Structure

Organizational Reporting Structure

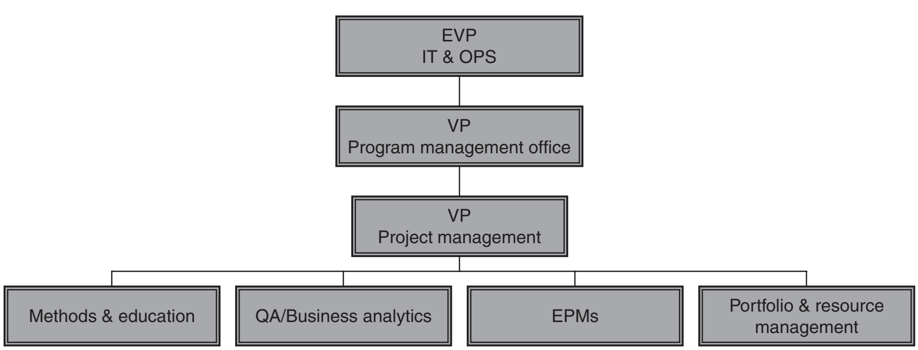

FIGURE 19.6 The organizational reporting structure.

Functional Structure

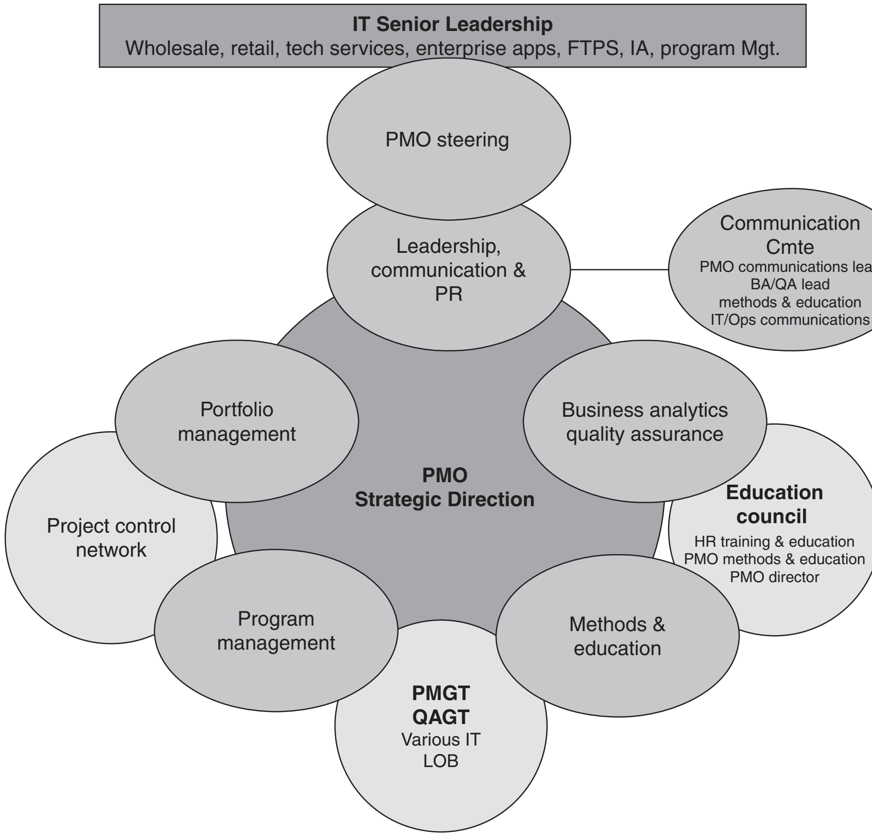

FIGURE 19.7 IT senior leadership.

Policies and Governance

The PMO is formed and derives its authority from the IT & Operations executive leadership. This charter along with existing bank policy found in Fifth Third's "Policy Center" formally constitute the PMO as a part of the overall bank structure. Existing Information Technology policy "establish(es) a standard methodology for the Information Technology Department to use when acquiring or developing software"[5] which is complemented by a more defined project management policy which dictates "requirements for IT project management oversight".[6] Defining the aforementioned methodology and how to use it in the execution and oversight of projects is the central tenet of the PMO's mission.

[5] Acquisition and Development Policies. Information Technology Policy Summary, Fifth Third Bank Policy Center.
[6] Project Management Policy. Policies and Guidelines, IT Policy, Fifth Third Bank Policy Center.

Project Controls

The PMO shall define and manage a project control network designed to ensure that projects not only follow the PMO prescribed methodology but that they do so within acceptable limits of tolerance as related to scope, budget and time.

Scope

The PMO shall have oversight responsibility for the following:

- Project management methodology and practice.
- Project management education and Bancorp related project management body of knowledge.
- Business analytics methodology and practice.
- Quality assurance methodology and practice.

Customers

The PMO will service the entire Bancorp as needed including IT and Operations as long as the project needs fit well within the PMO's methodology and are not better suited for other project methodologies such as Six Sigma.

Approvals

____________________	____________________	____________________
VP Project Management	VP Program Management	EVP/COO

Communication Strategy. A comprehensive communication strategy will be a key building block of any PMO creation effort. The communication strategy needs to be tailored to a varied audience ranging from executive management to lower-level staff and across various business verticals.

Effective two-way communication results in the delivery of the PMO implementation strategy and provides the PMO with a valuable feedback loop to gauge the effectiveness of its efforts. Attention to proper branding of all communications out of the PMO is important as the office strives to create and mold its image within the company culture. Standardization of the communication vehicles not only provides a stable branded image but also streamlines efforts so that the PMO staff can concentrate on the message, which is where the value is and not on the format, which is less important. This standardization may be accomplished by developing standardized communiqués based on the message type and content that the PMO regularly delivers to its customer base. The following is an excerpt from Fifth Third Bank's PMO communication plan:[7]

Communiqué Name: Methodology Roadmap

Purpose: Communicate changes to any of Fifth Third's life cycle methodologies actively managed by the PMO.
Description: This communication plan must have five main sections

- What's New: This section will clearly outline the change being introduced to the methodology. Reference should be made to the pre-change method and how this change will impact that baseline.
- Purpose: A brief explanation of why this change is being implemented.
- Scope: Clearly specify the scope of the change. PMs will want to understand how this affects "in-flight" projects, so this section must clearly define which projects (new, on-deck or in-flight) and even what phases will be impacted.

[7] A standard communication plan will have many such standard communiqués for things such as newsletters, change events, organizational changes to personnel, etc.

- Impact: A detailed explanation of how this change will impact project execution. Care must be taken to write this in first-person form to personalize the message from the perspective of the role (i.e., BA, QA, PM) which must implement the change.
- Implementation Date: The date that the change becomes effective.

It is important to note that given the strong ties existent between the project management application and the methodology itself, the release schedules of the methodology and the project management application must be carefully synchronized.

Look and Feel: Figure 19.8 represents the communication template used by Fifth Third Bank's PMO for communication of changes to its methodology.

Frequency/Timing: As needed due to modifications approved by either the project management guidance team (PMGT) or quality assurance guidance team (QAGT). No more than once per quarter due to corporate impact, assimilation, and Compass[8] release management considerations. See Table 19.1 for timings and other considerations.

Intended Audience: Project Management team community including the following:

- Project Managers
- Business Analysts
- Technical Analysts
- Architects
- Resource Managers
- Quality Professionals

Delivery Format: E-mail created by IT and Ops Communications.

PMO Success by Design Fifth Third Bank

METHODOLOGY ROADMAP

WHAT'S CHANGED:
Clearly outline the change being introduced to the methodology. Reference should be made to the pre-change architecture and how this change will impact it.

PURPOSE:
A brief explanation about why this change is being implemented.

IMPACT:
A detailed explanation of how this will change the way PMs run their projects. Care must be taken to write this in a format that personalizes the message from the perspective of the PM.

This section should not be too long in the e-mail. . . . if there is a great deal to say about the PM impact, link to more detailed information on the intranet.

IMPLEMENTATION DATE:
Date, 2006

SCOPE:
Clearly define which projects (new, on-deck, or in-flight) and what phases will be impacted.

TRAINING:
Optional section—only applies if training is needed

FIGURE 19.8 Communication template used to communicate changes to methodology.

[8] Compass is the internal brand name of Fifth Third Bank's project management software.

TABLE 19.1 PMO Communication Schedule

	Implementation dates & lead times			
Message & intent	Q1 1st Mon Jan	Q2 1st Mon Apr	Q3 1st Mon Jul	Q4 1st Mon Oct
Initial Communication. Include class awareness and signup information as needed.[9]	2 Weeks 3rd Monday Dec.	2 Weeks 3rd Monday Mar.	2 Weeks 3rd Monday Jun.	2 Weeks 3rd Monday Sep.
2nd Reminder	1 Week 4th Monday of Dec.	1 Week 4th Monday of Mar.	1 Week 4th Monday of Jun.	1 Week 4th Monday of Sep.
Final Notice	1 Day Last Friday of Dec.	1 Day Last Friday of Mar.	1 Day Last Friday of Jun.	1 Day Last Friday of Sep.

Operating committees must be an integral part of any communication effort. These bodies must operate at several organizational levels, and the message must be tailored to the audience depending on their focus (strategic vs. tactical). These are a few key decision-making bodies in use by the PMO:[10]

Steering Committee:
Membership: Senior company and PMO leadership
Focus: Strategic. The steering committee provides high-level direction to the PMO on what areas to focus. It also serves the PMO as an enforcement arm by driving change from the top down.

Guidance Teams (GTs) or function specific committees:
Membership: Mid-level management
Focus: Tactical. GTs are subject matter specific, so it is not unusual for PMOs to have several GT type of bodies. A methodology GT is often useful when developing a methodology in-house for instance. GTs are especially good for promoting bottom-up change as well as giving the PMO valuable insight "from the trenches" on where the PMO needs to devote its efforts.

Policies and Standards. Policies and standards are important foundational components that must be put in place early on in the PMO development process. Company policies related to project management provide a clear indication of executive backing of the PMO implementation effort underway. Polices should provide broad pronouncements of intent with the more granular detail supporting the policy statement usually found at the standards level. One key aspect of moving the detail to the standards level is that policies are usually subject to rigorous approval and change processes, whereas standards may be changed at the functional department level. So if a company develops a policy that states, "It is company policy to manage projects using established and managed project life cycle and control frameworks created by the PMO," that policy will remain unchanged over time, but the makeup of the project life cycle, which is standards based, may evolve over time and be changed by the PMO Steering Committee approval, thus providing a balanced mix of control rigor with operability.

In terms of standards, those come in several flavors. There are documentation standards which are oftentimes referred to as *methodology artifacts.* So a methodology may have a functional requirements document standard, for instance, which may not be altered. There are also control standards, which essentially outline the upper and lower limits of various categories, such as cost.

[9] Class considerations: Instructor led or online classes may be needed depending on the scope of the changes to the methodology being rolled out. Coordination with HR/Training and SABA may be needed here and will likely need to be done prior to the 1 month lead time announcement.

[10] Note that functional interaction of these communication bodies is described in the functional organization of the PMO Charter document previously described.

These standards promote the operability of the methodology as they preclude changes from going through the change control boards that so many PMOs are familiar with. To clarify, if a project has a \$100 budget but the PMO did not establish cost control standards, a \$1.00 overage must be processed through that project's change control board. If, however, standards are in place stating that any project coming in at plus or minus 5 percent of their initial baseline budget are deemed under control and require no external oversight, then the PM has the authority to unilaterally approve changes up to \$5.00, thus streamlining the process.

Processes and Procedures. We have discussed in previous sections the central role that methodologies play in PMOs. Methodologies are detailed descriptions of the project management process. After many years of constant refinement, project management methodologies are by now mature and somewhat commoditized. While the number and description of their phases may change, the general implication is that they provide a framework by which customer requirements are decomposed and analyzed, work is planned and executed, and the results are put through various levels of testing. Once testing shows the product to be acceptable, it is put into production.

An early decision to be made during the creation process of a PMO is whether to create or purchase a methodology. While there is no clear answer to this question, some considerations may lead down one path or another, be it buy or create.

Methodology creation tends to work well for the following:

- Internal pull PMOs where companies are willing to invest the time and resources to create a methodology. External consultants are often called in to lead this process, which usually results in a tailored albeit expensive solution
- Companies that have at least a medium level of process maturity (usually found on a CMMI level 2 or 3) and understand the implications that phased, tollgate controlled work will imply
- Companies that have bought into the PMO value proposition and can stomach the long implementation timeline that methodology creation and later socialization will imply

Methodology purchase tends to work well for the following:

- External push companies operating under tight timelines that need some external requirements for process definition and control
- Companies with a lower level of process maturity (usually found on a CMMI level 1) where processes are not well defined, and the business is willing to mold current operations to fit the methodology process requirements
- Companies where the PMO's value proposition is not clear, so management must concentrate on the socialization (where the value lies) and not the creation of the methodology

Controls. The role of governance and control within the project office cannot be underestimated. A common pitfall for new PMOs is to concentrate on refining the PM methodology to the detriment of controls, which may not get adequate attention. It's important to realize that a mediocre methodology with a great framework of control is oftentimes better than a great methodology with little to no controls. If the methodology is the project management roadmap, the controls are the traffic cops that make sure you don't crash trying to take shortcuts.

There are two levels of controls, those at the project level and those pertaining to the portfolio. Project level controls come in many flavors, and the right mix for your company will depend on several factors, including industry, regulatory requirements, maturity, culture, geographical dispersion, and organizational structure among others.

Fifth Third Bank's control framework starts at the project team level where documents and tollgates are early control tools at the disposal of the project manager. Each required document (according to established methodology) has minimum signature requirements according to roles defined early in the project definition phase. Asking project stakeholders to sign project artifacts is a subtle but strong control mechanism requiring project stakeholders to attest that the project remains viable throughout the life cycle. See Figure 19.9 for a graphic representation of the concept.

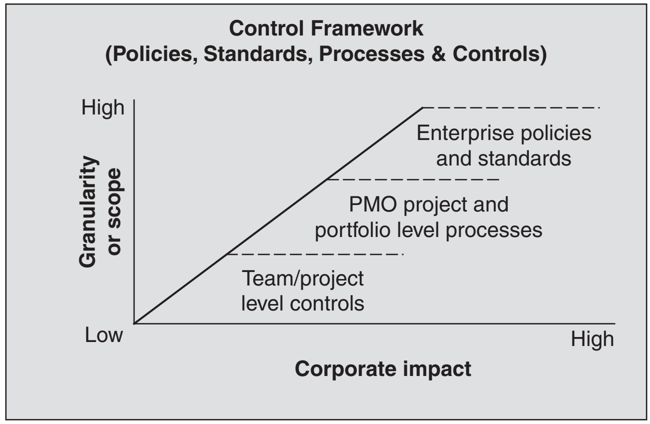

FIGURE 19.9 Control framework.

Fifth Third's methodology also has tollgates built in to make the team pause and reflect on work to-date, making go/no-go decisions on certain project components, or the overall project itself. These are crucial meetings designed to not only verify that work products completed within that phase are acceptable but perhaps more importantly to verify that the project's objectives are still in alignment with the overall business strategy. These tollgate meetings tend to challenge new project managers that feel somewhat burdened by the requirements of each of these tollgates. All documents must be completed, each document must have all signatures, and stakeholders must be in agreement to continue. The reality is that experienced project managers do this type of course validation and correction not as a single event but rather through constant interaction with team members thus making the tollgate a simple review of what has been discussed continuously throughout the project to date. Effective control takes place daily not just at these formal meetings.

Closely related to the tollgate process is a verification process that Fifth Third Bank has institutionalized called a compliance review process (CRP). This process is especially useful to companies in highly regulated industries such as banking and is simply a PMO assessment of the tollgate process where the PMO's quality assurance staff verifies that the tollgate was properly conducted, and all artifacts exist and are signed per the methodology's requirements. Assessments findings are then analyzed down to root cause and used to prepare monthly management reports in the form of a Quality Scorecard.

An important compliment to the compliance review process is the project review boards (PRBs). While the main objective of the CRP is to assure compliance to external governance bodies, the PRB's main function is to gauge project health. PRBs look to get deep insight into the project's scope, budget, timeline, and quality of the deliverable and do this through the study of project documentation along with team member interviews (usually the project manager and a few other crucial team members). PRB membership is crucial, as the members must have enough influence within the organization to affect change, especially when reviewing a troubled project that needs some type of course correction. Organizational structure will influence the PRB design; the aim should be to have a representative cross section of the major lines of business within the company at the highest levels possible that are still able to be operational. Going too high along the chain of command to the senior vice president or C-level will provide membership with too much of a strategic focus and not the operational understanding needed to move barriers to project success. Once staffed, a vital next step in the PRB creation is clearly defining the scope of authority to be given to this body. Will PRB recommendations be binding, or is follow-through from the project team merely optional? It is the cross-functional nature of a properly staffed PRB that gives it its efficacy, but it is also what makes granting it a high level of authority such a difficult accomplishment, especially in traditionally siloed organizations. Ideally, PRBs should have binding authority and the ability to follow up on recommendations, especially those relating to large corporate initiatives spanning multiple lines of business where the PRB is poised above those silos and can act with enterprise vision.

The role of governance closely relates to control, but in the case of Fifth Third Bank, it's thought of in terms of interaction with external actors such as federal and state regulatory agencies. The PMO plays an important role here as these agencies may look to the PMO to provide evidence of good stewardship of company funds, which are often expended through project execution of strategic initiatives. As the PMO is chartered and established, it will be important to verify with internal departments such as legal, risk, finance, and audit to get a good understanding of the role the PMO will play in dealing with regulatory agencies. As an example, Fifth Third Bank's PMO is responsible for project and quality related Sarbanes-Oxley controls, and it is the vice president and PMO director who creates and signs the controls.

19.6 PROFESSIONALIZATION OF THE PM STAFF

Training and education are central components of any PMO's mission. While each component seeks a very different end result, proficiency in each area is required for repeatable and reproducible project success.

Simmilar to Maslow's Hierarchy of Needs[11] where basic needs must be met prior to meeting higher level needs, Figure 19.10 shows how work must begin at the education level where company personnel are immersed in general project management principles and theory. A standard practice is to adopt PMI's[12] PMBOK[13] and teach the nine widely accepted project management knowledge areas. This provides personnel with the knowledge base required to understand the nuances that are introduced as the methodology is tailored to specific business practices and industry requirements.

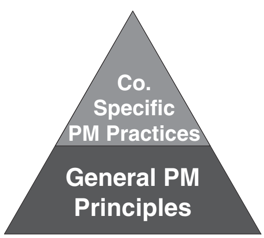

FIGURE 19.10 PM training building block.

With a solid basic understanding of project management, personnel can then be trained in company specific topics, which extend generalized project management practices by tailoring them to fit specific needs. As an example, PMI's body of knowledge includes a cost management knowledge area that provides a basic understanding of how project costs are tracked. This knowledge is extended through company specific training that provides personnel with detailed guidelines of what can be expensed and what is capitalized. It may also provide specific discount rates used for cash-flow calculations and may even delve into tool specific content that explains how proprietary financial software is used to track project costs.

As is the case with methodology, education and training also requires an early buy or develop decision but differs from the methodology case in that curriculums are often a mix of internally developed and externally sourced material. The basic PM education is oftentimes sourced externally with the company specific material developed and delivered internally. Large companies with one 100 or more project managers and mature processes tend to develop and deliver the material using internal resources usually within the PMO or corporate training departments.

A key component of education and training is the delivery of industry-specific subject matter. Effective curriculums are those that provide project management breadth with industry specific depth resulting in a well-rounded team member. A central tenet of the PMO curriculum we developed at Fifth Third Bank is the inclusion of non-PM specific material. Our curriculum includes the following:

[11] http://en.wikipedia.org/wiki/Maslow's_hierarchy_of_needs.
[12] PMI: Project Management Institute.
[13] PMBOK: Project Management Body of Knowledge.

- Banking classes designed to provide team members with a basic understanding of how a bank works
- Leadership classes intended to develop this fundamental project management skill
- Communication and presentation classes that give team members ideas on how to tailor messages to different audiences
- Project case studies based on actual bank projects that have gone exceptionally well or bad and are dissected for lessons learned following the traditional Harvard Business Case Study approach

19.7 PROJECT AND PORTFOLIO OPTIMIZATION

The PMO's role in project and portfolio life cycle optimization will vary depending on the chosen PMO structure (see Figure 19.7 for PMO roles). Centralized project offices with project management staff will obviously play a larger role in project optimization than decentralized offices where the PM staff report through the line of business.

Regardless of the structure, the concept of optimization as it relates to projects deals mostly with the overall health of the project; thus, in terms of project optimization, the PMO will try to keep the project under control as it relates to scope, costs, schedule, and quality. To do this end, the PMO will play a part in enterprise resource management and provide logistical assistance to procure and secure resources from various functional areas; PMOs oftentimes staff a resource manager position for this very reason. The PMO will also play an active part in clearing interdepartmental roadblocks that oftentimes arise in large corporations with many functional areas where each department has its own agenda and various departmental agendas may not necessarily be coordinated at a high level. The PMO's objective high-level view of the entire project portfolio will allow it to better judge which areas they should give and take as their individual agendas are modified for the good of the corporation. It is through this clearing of roadblocks that project execution is optimized. This in large part is the work of a good project review board as previously discussed.

Quality is another area where the project management office will play a large role in optimization, especially if the PMO has a quality mandate as is the case with Fifth Third's PMO. In the case of quality, the PMO provides objective analysis of work products and oftentimes functions as a center of excellence for highly specialized technical work, such as performance testing, in terms of software development. Providing this type of final review prior to launching into production is another key way that the PMO optimizes project delivery by catching and correcting deliverable bugs or errors before they can have customer impact.

The PMO's impact on project optimization can best be described as assuring the proper execution; what is traditionally referred to as "doing things right." While the benefits obtained from doing things right cannot be underestimated, the synergies derived from doing the right things are not to be overlooked. In this regard, the PMO can and should also be a major contributor in the area of portfolio management, which deals with choosing the right mix of projects to green light for execution in an attempt to maximize limited resources. Portfolio management tends to have different meanings for many people, so allow me to explain how the term *portfolio management* will be used going forward.

Portfolio management is not a single well-defined action but rather a series of processes culminating in the selection and active management of a group of projects resulting in company assets once implemented. We often associate the concept of life cycles with

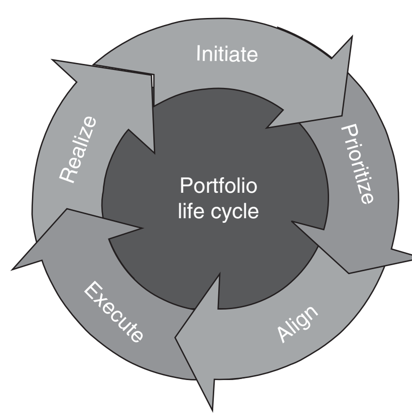

FIGURE 19.11 Fifth Third Bank's portfolio life cycle process.

projects, but the concept is equally appropriate when referring to the grouping of these projects into a portfolio, and understanding the portfolio life cycle will aid in explaining the series of aforementioned processes.

The process starts in the "Initiate Phase" with the documentation of project ideas resulting from an identified need to fix or create something. This pipeline of ideas should be regularly reviewed to decide which ideas align with corporate strategy and are strong enough to merit project scoring and ranking. This scoring and ranking process takes place in the "Prioritize Phase" and is the result of a formalized review process using the following criteria:

- Data availability and traceability: Will there be reliable data to verify that the project delivered results?
- Financial merit: Usually rated through return on investment or net present value calculations.
- Risk: Impact times Probability on several areas such as financial and reputation.
- Complexity: Has this type of project ever been attempted? Do we have the required expertise?

Once scored, projects are ordinally ranked according to project score, and resources are assigned and leveled according to capacity. Prior to and during execution, portfolio managers are constantly verifying portfolio alignment with changing corporate strategy to maintain direct ties between cost saving or avoidance strategies as well as revenue generation strategies to chartered projects. The "Execution Phase" follows with the project progressing through whatever project methodology and control framework has been adopted by the enterprise. Once completed and put into production, the portfolio life cycle concludes with the "Realization Phase," where projects are studied in the production environment to verify that the projected benefits were realized.

CHAPTER 20

THE EVOLUTION OF PROJECT OFFICE AND PORTFOLIO MANAGEMENT AT AMERICAN MODERN INSURANCE GROUP, CINCINNATI, OHIO

Mark Heitkamp

Lee Pinkerton

Mark Heitkamp-Vice President of Project Office; joined American Modern in March of 2000 to establish a newly formed project office department within the organization. To date, American Modern's Project Office has from a portfolio perspective managed the successful delivery of 639 projects ranging from a major business acquisition to minor statutory reporting requirements. Prior to this, Mark was vice president of information services at Charter Insurance Companies based in Richardson, Texas. His background includes over 20 years insurance industry experience within the project and software development arena. His experience has mainly been around the development of projects, which has made him realize the value of best practices within project management. Through his experiences, he has come to recognize the importance of aligning the project activities to the corporate objectives and the value of applying common sense to the processes established.

Mark has his Project Management Professional (PMP) designation from the Project Management Institute along with majoring in computer science at the University of Cincinnati. Currently, he is serving as an Executive Advisory Board member for the Southwest Ohio PMI (Project Management Institute) Chapter. He is also a member of the Management Advisory Counsel for Xavier University.

Lee Pinkerton is a Director of Project Management for American Modern Insurance Group (www.amig.com) in Cincinnati, Ohio. She helped establish a Project Office department to serve the needs of the business organization and is responsible for the planning and execution of a portfolio of projects to enable our agents to quote, issue, and renew insurance policies over the Web. To date, American Modern's PMO has managed the successful delivery of 450-plus projects ranging from a major business acquisition to minor statutory reporting requirements. Lee has been a project manager for over 20 years and has worked in a number of disciplines, including engineering, consulting, and consumer products.

Lee holds a Bachelor of Science degree in Computer and Information Sciences from the University of Oregon. Prior to joining American Modern Insurance, she managed Information Technology (IT) and Quality Engineering projects for Hewlett-Packard Co. and Structural Dynamics Research Corp. She earned her Project Management Professional (PMP) designation in 1999, and has been recertified twice. Lee served as Marketing Director for the Project Management Institute, Southwest Ohio for three years. In addition to managing the development of Web-based applications, Lee teaches a course on Business Requirements Definition and is actively engaged in change management activities throughout her company.

20.1 OVERVIEW OF AMERICAN MODERN INSURANCE GROUP

American Modern Insurance Group is a market expert in the specialty insurance business. A subsidiary of The Midland Company (NSD: MLAN), we have more than 40 years of experience in the manufactured housing insurance sector. Our company offers specialized products and services for residential property, like mobile homes and specialty dwellings. American Modern Insurance Group also offers specialty policies to meet the needs of consumers in the recreational market, including motorcycles, snowmobiles, watercraft, classic cars, and travel trailers. Our logo, depicted in Figure 20.1, suggests that we deliver products and services "beyond the standard."

FIGURE 20.1 American Modern Insurance Group logo.

We aspire to be the *premier specialty insurance company* in our chosen U.S. markets, and we have created a sustainable competitive advantage by providing our policyholders and business partners with products, services and relationships they value. We have built distribution channels to meet the consumer at the point of sale, in the agent's office, and on the Web. Each year an increasing percentage of our sales and service is delivered via modernLINK, our primary Web application for agents.

We are headquartered in Cincinnati, Ohio, and have approximately 1,200 associates nationally. We consistently earn excellent industry ratings for financial stability as well as superior coverage and claims service.

20.1.1 Our Value Proposition

American Modern Insurance Group delivers value to its policyholders and business partners in the following ways:

- Offering a wide and deep array of specialty insurance products and services
- Focusing its expertise exclusively in specialty markets
- Providing easy-to-use technology which provides real-time capabilities for quoting, underwriting, and booking insurance, as well as policy maintenance
- Providing best-of-class claim and account service
- Contributing to the success of its business partners

The leadership of our company is focused on multiple imperatives to deliver on this value proposition. We recognize that in order to protect and enhance our position as a leading specialty insurer, we must continually deliver on these strategic imperatives:

- We must *reduce the cost of doing business* to allow us to create *enhanced specialty products.*
- We must *maximize market awareness* of our products to allow us to *optimize our distribution network* throughout the marketplace.
- We must deliver *easy-to-use technology* to our distribution network to become a carrier of choice in our chosen markets.

20.1.2 Project Management in the Insurance Industry

To understand the basics of project management in the insurance industry, it helps to understand the business environment. The insurance industry in the United States is a highly competitive environment with a great deal of governmental regulation. Many of the product lines have become commodity products with very little differentiation in price from one company to another. Despite public opinion, insurance companies typically operate on a very small profit margin, which means controlling expenses are a critical component of the business model. Technology is one of the key differentiators in providing unique products as well as controlling expenses. In many cases, it is a short-term differentiator based upon the competitors' ability to duplicate any technology advancements. A clear example of this has been the sophistication demonstrated by many insurance companies to accurately price their products, using highly advanced actuarial technologies. This has also been a primary driver for the commoditization of many of our product lines.

A high saturation of insurance companies also exists in a multitude of business sectors. This makes the industry very susceptible to acquisitions and mergers.

What this means from a project management perspective is that most of the project activities center on technologies to reduce expenses and provide ease of use to the consumer. There are also numerous project activities in support of statutory requirements for the various state-level Departments of Insurance, as well as project activities resulting from acquisitions and mergers.

A list of typical project categories within an insurance company includes the following:

1. Policy Administration
   - Quotes
   - Policy Issuance
   - Billing and Payment Processing
   - Policy Cancellation and Reinstatement
   - Endorsements
   - Renewals
2. Claims Processing
3. Management Information Systems (Analytics)
4. New Product Development (Product Filings, Coverages, Rates)
5. Statutory Reporting
6. Partnership Interfaces
7. Company Mergers and Acquisitions

It is within this context that the Project Management Office at American Modern Insurance Group functions. Our mission is to ensure that the company's project portfolio supports these strategic imperatives.

20.2 PROJECT MANAGEMENT OFFICE OBJECTIVE

The primary objective of our Project Management Office (PMO) is to protect American Modern's "return on investment" on all project development. We accomplish this by providing effective processes and insuring ownership for those processes. As managers of the portfolio of cross-functional projects, we:

- Capture all planned and approved projects in a centralized portfolio.
- Prioritize projects based on their alignment with corporate strategies, return on investment, and probability of success.
- Manage the Project Review Committee and attendant processes.
- Conduct the annual planning process as it relates to building the portfolio:
  - Estimate resource requirements
  - Monitor resource investments (actual to plan)
  - Track the projects waiting for resources, and ensure carryover to the following year

- After delivery, we work with the project manager and business sponsor to measure the actual business benefit/ROI (return on investment). We look for ways to remove obstacles to full realization of the planned benefits.

In addition to the portfolio management responsibilities, our project managers are fully engaged in the delivery of many projects (primarily IT related). We work closely with the Business Application Managers in the Information Technology (IT) department to "plan the work and work the plan." The IT managers have a significant role in project management and are the experts in the system development life cycle. The PMO is focused on bringing the business and technical communities together and resolving issues that impact successful completion of projects in the portfolio.

Our PMO also manages projects primarily focused on building business capabilities. We are experiencing an increase in project work related to change management (CM). We are learning how essential CM is for full realization of the planned benefits, including migration to new technologies and reductions in our expense ratio. Our project managers are learning new skills in this domain and managing workstreams dedicated to communications planning, training and mobilization, organizational alignment, and marketing/promotion. The variety of our projects is one of the rewarding things about working in the Project Office.

20.2.1 Genesis of Project Management Office

Established in early 2000, the Project Management Office was initially established within the IT department. Mark Heitkamp was recruited as its director. "I joined the company specifically to start our Project Management Office. At the time, we took five people out of individual departments to work in the PMO. These people had skills in business analysis, project coordination, and training. We immediately began providing project management services on many initiatives, both large and small." Coming from a background of 20 years of insurance industry experience, primarily in the development of information systems, Mark has a strong appreciation for the value of project management and close relationships with the business.

One of our first steps was to establish a core team of subject matter experts in project management and business analysis. Within the first year, three senior project managers were hired who had many years of experience in delivering large business and scientific applications. The profile of the project managers varied; some had many years of insurance industry experience, and others had extensive experience in the discipline of software engineering. The mix of backgrounds has been healthy for our department; we have learned best practices from each other on how to handle the differing needs of the business and technical communities.

When building a PMO team, you have to be somewhat selective and get the right people on board—people who can speak the language of the business and also be a strong liaison to the technical teams. Our experiences have taught us to recognize the importance of aligning the project activities to the corporate objectives and the value of applying common sense to the processes. To thrive in a PMO long-term, you have to think like a business person and deliver like an engineer.

Today, our PMO is a well-established service organization within American Modern. Our goal is to be viewed as an internal consulting organization that provides *project management processes*—defined as a set of disciplined activities, methods, practices, and role definition—used in project development. The PMO plays an advisor role on all cross-functional project activity to ensure processes are used effectively and that the project has proper participation from the team members. We believe in teaching the business community how to run their own projects and support the concept of "virtual" project managers. Starting with the annual planning cycle, we build a portfolio of project initiatives that supports the annual strategic plan of the business. This enables us to gain an appreciation for the business drivers behind each initiative. One of the signs of our success is that several of our senior project managers have been recruited to join various business departments.

20.3 PROJECT OFFICE CERTIFICATION

Our PMO coordinates and promotes professional development training for various project management processes and roles within the organization. Working closely with Human Resources and Learning, in 2002 we established the *Midland Project Office Certification.* Open to all associates within Midland (and American Modern Insurance Group), this certification responds to the shift toward project work that many of our associates and managers are experiencing. It helps develop the skills of our associates in the following areas:

- Leading or participating on a project team
- Analyzing business requirements and writing use cases
- Planning and managing the delivery of information systems
- Initiating new products or rates
- Identifying and improving work processes
- Implementing a new sales program

Taught by the senior members of PMO, the two instructor-led classes are *Essential Skills for Project Management* and *Defining Business Requirements and Work Processes.* Four e-learning classes are included in the certification, including coursework on topics such as project costs and quality management, process improvement, planning, and change management. The final component of certification is an on-the-job project. Participants will demonstrate application of major project management processes/tools in completing an assigned project. This project is evaluated by a member of the PMO team. Associates who complete the certification are recognized at the annual Midland University graduation.

Project management classes are popular with our associates, and the topics are applicable to many careers within American Modern Insurance Group. To date, 185 of our employees have attended the two-day Essential Skills for Project Management class, and over 150 associates have completed the half-day Defining Business Requirements and Work Processes training. This class was recently expanded to include a module on the *Project Review Committee* and how projects are approved and prioritized at American Modern Insurance Group. In the last four years, a total of 18 people have obtained their Project Office certification, and several have achieved their Project Management Professional (PMP) designation.

We also believe in the importance of networking with project management professionals in other industries within the greater Cincinnati area. A number of our project managers are members of the Southwest Ohio Chapter of the Project Management Institute, and some have served on its Board of Directors. We also have representation on the Executive Advisory Board. We commit resources to plan and manage PMI professional development events and have teamed with colleagues at Xavier University to teach executive leadership courses on project management. These community outreach programs allow us to remain current with thought leaders in the field and provide us with a sense of community within our profession.

20.4 STRATEGIC PLANNING AND THE PROJECT PORTFOLIO

The American Modern Insurance Group PMO provides a bridge between the strategic vision of Midland's leaders and the activities that turn that vision into reality. Project Portfolio Management enhances our organization's ability to meet its strategic goals. The following diagram (see Figure 20.2) shows how the mission and vision of our leaders influences the long-range planning, project evaluation, and selection, and ultimately prioritization of projects. Resources to ensure their successful implementation and deployment are allocated at the operational level.

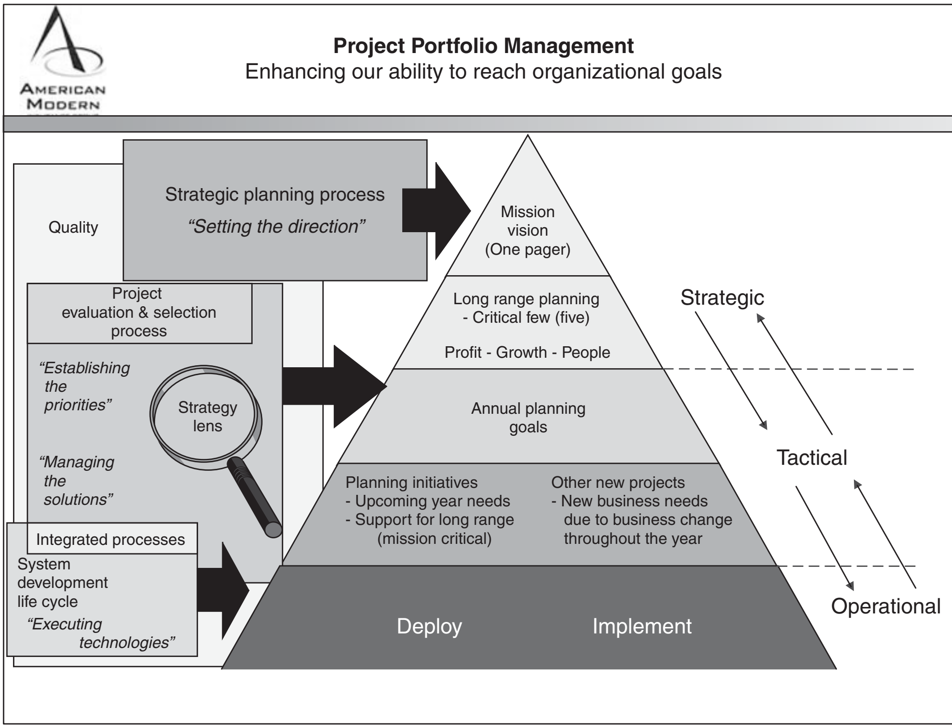

FIGURE 20.2 The life cycle of portfolio management at AMIG.

Every year we experience a high volume of projects related to changing market conditions, technology improvements, increasing state regulations, and Sarbanes-Oxley. The PMO plays a role in harmonizing all of these forces and reducing the white noise. We continually look at the list of priorities through a strategic lens and work toward alignment across all areas of the organization.

20.5 PROJECT MANAGEMENT OFFICE EVOLUTION

One of our strategies for survival as a PMO is to keep our department small, around 15 people. All of our members *deliver* on projects, both big and small in size. We recognize that as a cost center, the value we provide is directly tied to our efficiency and cost consciousness. Based upon the pressures of maintaining a low expense ratio, it is sometimes difficult for insurance companies to initially justify the development cost of a PMO as a core business function. Even for the ones that develop a PMO, in many cases they do not always recognize the value immediately and do not allow time for the PMO to mature into a value-added organization. The companies that have made the investment and allowed time for the development of project management within the organizational culture have been able to reap its benefits.

To aid this process, the development of a PMO within an insurance company should have strong measures built in. It continually needs to demonstrate the incremental value it provides as it matures within the organization in the form of metrics—projects underway, projects delivered, average cycle time, etc. We publish various metrics and reports showing the total number of projects in

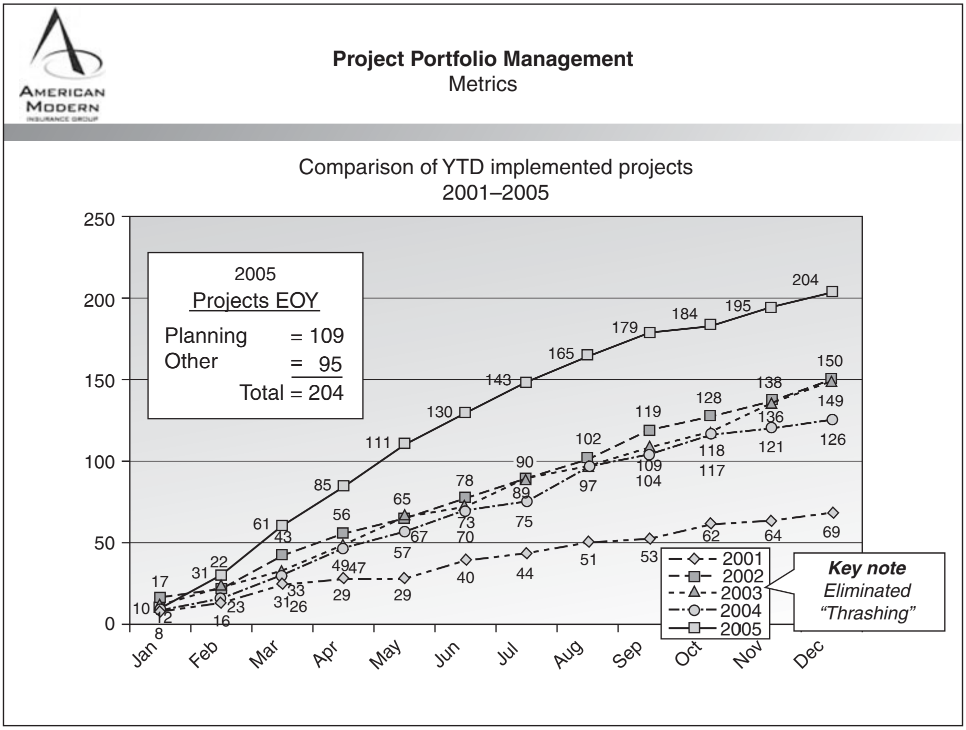

FIGURE 20.3 Metrics used to track completion of projects in portfolio.

the portfolio, the status of all open projects, the high priority projects identified by each department, and the number completed by year-end. The next graphic (see Figure 20.3) shows the number of projects delivered over the past five years. We have learned that "thrashing" between too many priorities slows down the overall delivery of projects and by helping the resources remain focused on their primary deliverables, things get done faster. The PMO aids the development staff in saying no to unapproved requests and provides a buffer between the IT department and the business.

20.5.1 Lessons Learned in Building a PMO

It takes about three years to establish an effective PMO. In a recent PMO Summit we attended, the survival rate of PMOs was discussed. It turns out most failures occur within the first two to three years. This substantiates our own experience and validates the perception that we really hit our stride in about the third or fourth year.

When we look back at the evolution of our PMO, the first year was like our "honeymoon" period. We implemented some things that were very appealing to senior management and the executive level of the organization. We created an inventory of ongoing projects and put some new review processes in place. It all added value. The expectation was there would be no more problems with projects. This is not true. Although we have become much more efficient, there's still no silver bullet to project management. That's one of the things we realized after the first year.

So although the first year was very appealing to executive management, in the second year there was some disillusionment from the same group. Projects are still difficult and require active sponsorship; it is a continual balancing act between time, scope, and resources.

Interestingly, those we appealed to in the second year were the ones doing the work—primarily technical leaders and development staff. The PMO created a more structured environment with clearer priorities. With documented business requirements and up-front analysis, there was much less rework downstream. So the people that we won over in the second year were the members of the project delivery team.

The third year is where it all comes together. The project portfolio management processes start to take hold in the organization. For example, when we first started the PMO, the word *sponsor* had no meaning in the organization. By the third year it was commonplace for the word to come up whenever discussing an initiative or a project. Most managers understood the role of the sponsor, having witnessed their peers in the role. “Who’s going to sponsor this?” became a commonplace question whenever new projects began.

The third year is when we had our own department outside of IT. A big part of our success has been the portfolio management piece, where we create the inventory and achieve alignment across the organization.

In hindsight, these were some of the key things we implemented to help our PMO mature:

- The Project Review Committee (PRC) provided a structure and process to evaluate and prioritize project activities.
- The PRC became a marketing tool and got the business involved in the whole process. Project ownership was transferred to the business.
- Key leaders participated in the Project Review Committee, and they began to recognize the value of what we were doing. This was instrumental to our success.
- The planning process hit a home run. When we went through the planning process and sorted through everything to determine the priorities, our business users began to understand the value in focusing our resources to achieve our goals.
- We also created our project management certification program which helped us educate associates on basic project management methods as well as processes specific to our organization.

These are all steps that we took early on. One of the unique things about our PMO (which might be different from other organizations) was that we gradually eased into the discipline of formal project management processes. We didn’t force-feed the organization, and in the long run this helped us succeed. Each time we introduced something, we explained it and demonstrated its value before introducing more processes. We were always practical and applied the art of project management to the science of process improvement. By delivering project management services, our projects managers practiced what we preached and saw what worked and what didn’t. If a process was inflexible or did not add value, our project managers were usually the first to protest (and not comply!). By remaining flexible and sensitive to the needs of our internal customers, we were able to adapt and refine our processes so that they enabled the technical delivery of projects that have demonstrable business value.

20.6 ANNUAL PLANNING PROCESS

Within our first year of operation, the PMO was integrated into the company’s annual planning process. We also created a Project Review Committee (PRC) composed of members from all functional areas. Gradually, over the past six years, we have created a disciplined project culture which serves the needs of the business. One of our key mantras is, “It’s all about the business!” To effectively manage the portfolio, we strive to balance the projects added to the portfolio in conjunction with resources available to execute upon those projects. Figure 20.4 graphically depicts the balance between portfolio management and project execution based on available resources.

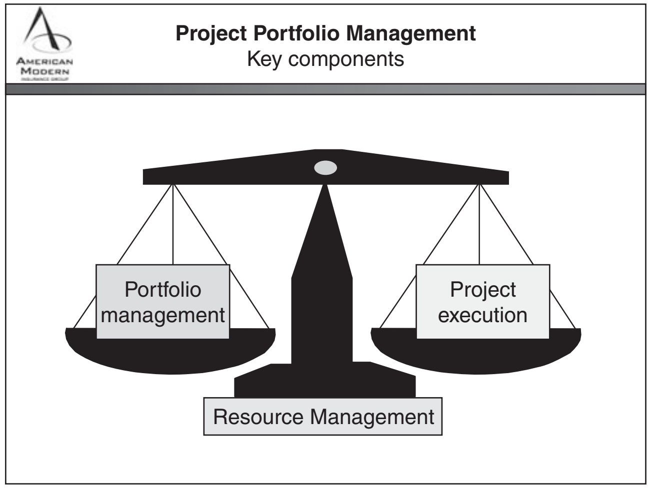

FIGURE 20.4 Key components of portfolio management.

We have a three-pronged approach to Project Portfolio Management (PPM). It is a constant balancing act. The list of projects is never static, and new strategic opportunities arise during the year that require us to redirect the organization's resources.

1. *Establish the portfolio* of projects that serves the needs of each business unit and the organization's overall strategic goals.
2. *Align the cross-functional resources* required to execute upon the plan.
3. *Execute the portfolio of projects* over a period of time under the guidance of the Project Review Committee.

Over the past few planning cycles we have also learned to allocate resources "off the top" to projects that support regulatory compliance activities. This ensures that we remain in sync with changing Department of Insurance (DOI) regulations. Most states require some type of filing for forms and/or rates that are to be used in that state. Most states have laws limiting the reasons for policy cancellations and nonrenewal, and require specific timeframes for the notification of insureds. These regulations are constantly changing and represent the cost of doing business in our industry. While they may not have a demonstrable ROI in support of our strategic objectives, they are imperative to ensure we remain in compliance. If we fail to allocate time and money to projects in these categories, we run the risk of losing our operational effectiveness, or worse, incurring regulatory action and/or expensive lawsuits.

20.6.1 The Planning Process

The objectives for the annual planning process include the following:

- Provide a benchmark of potential activities for the upcoming year
- Share information on project initiatives across departments
- Measure the potential impact of each initiative (e.g., return on investment)
- Estimate the resources required on a department-by-department basis

- Assign a priority order to each potential project
- Collaborate on the alignment of cross-functional resources
- Define and communicate existing resource constraints
- Set business expectations on what is realistic and feasible in the upcoming year
- Identify which planned activities can or cannot be executed

Our company's annual planning cycle begins in July with a two-day strategic planning retreat attended by the senior executives of the company. In preparation, each business unit draws up its initial financial and product plans, defining the market goals for each state where we do business. The Product and Sales teams meet to discuss and reconcile their premium and loss assumptions. Planning team members informally discuss the impact of their planning assumptions, and organizational alignment begins to occur naturally.

Next, the formal planning cycle begins with individual meetings between the PMO and each of the major business units within the company. Each department's leaders will identify the projects that need to be considered in the coming year to achieve organizational objectives. These can include projects to

- further our sales growth in key markets,
- enable acquisitions/mergers,
- limit our exposure in markets which are subject to catastrophic events (e.g., coastal exposure),
- extend or enhance our insurance products,
- better manage our relationships with producers,
- increase policyholder retention, and
- ensure we remain in compliance.

Statistical data from our data warehouse is utilized to analyze our past performance, verify the "right rate for every risk," and map our financial exposure by territory. Our product and actuarial teams will perform premium and loss ratio adjustments, update underwriting guidelines, and design products and rates for the next year's season.

The key process activities and dates are shown in Figure 20.5.

20.6.2 Resource Allocation

From year to year the focus of our project portfolio changes to keep pace with our business priorities. To ensure an equitable distribution of resources in support of these priorities, the PMO works with senior leaders to establish a top-down resource allocation plan across the entire company. This effort ensures that all departments are fairly represented at the conclusion of the planning cycle and that the resulting portfolio truly supports our core strategies of profit, growth, and people.

For example, from one year to the next we may invest more resources in property products as compared to casualty products. In other years our focus may be on strategic alliances or acquisitions. We also take into account several strategic initiatives which support our Web-enabled business model, and the resources to continue these on-going efforts are allocated "off the top" of the resource pool. This might limit the number of resources available for new initiatives, depending on the skill set required. We always designate a fixed number of people to work on regulatory compliance and IT infrastructure projects.

As an example, the following chart (Figure 20.6) shows the resource allocation analysis for a typical department of fifteen people:

Working from the bottom up, the chart shows that nine departmental resources are required to conduct day-to-day activities (the "baseline"). Next, three people are allocated to "mission critical" initiatives. This leaves a remainder of three people to work on new project initiatives. If, as a result of the annual planning process, the resource requirements have been estimated at 6.5 full-time equivalents (FTEs), we have an estimated resource gap of 3.5 FTEs. This gap is factored

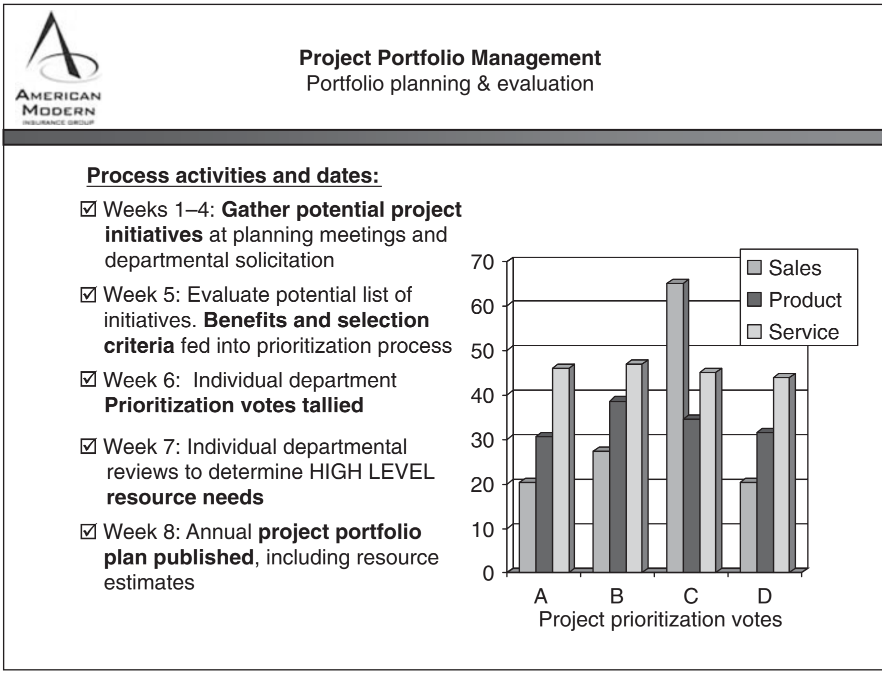

FIGURE 20.5 Typical cycle for portfolio planning process.

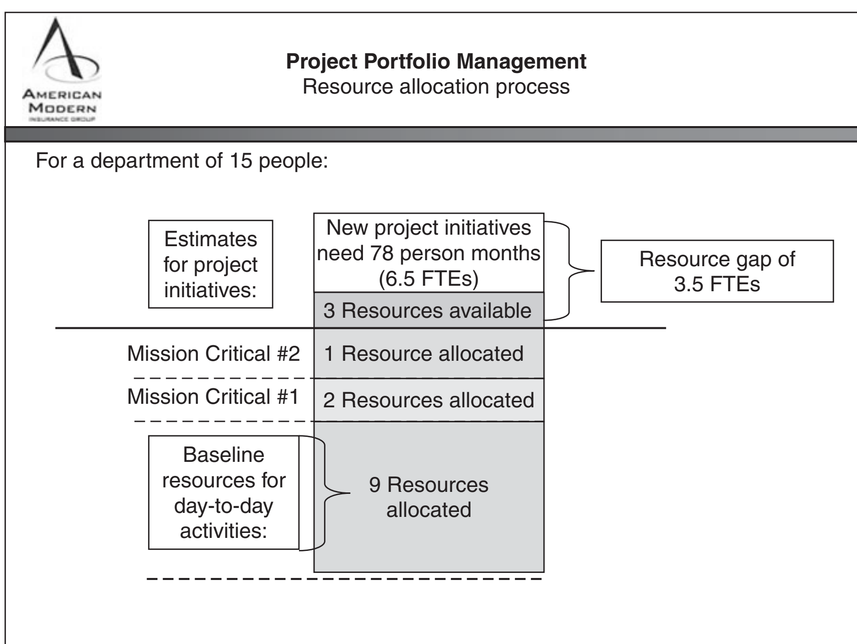

FIGURE 20.6 Departmental allocation of resources to annual project portfolio.

into our portfolio prioritization process and helps us establish realistic goals and expectations for the coming year.

20.7 BUILDING AND EVALUATING THE PORTFOLIO

During the planning cycle each business area works internally to identify and rank its list of desired projects. The PMO works with each functional area to document and consolidate the project lists from each department. To ensure a level playing field, each potential initiative is scored and prioritized using standard measurements such as the following:

- Estimated return on investment
- Benefits related to internal efficiency
- Support for corporate strategic plan
- Probability of success
- ROI impact over three years

As the portfolio is built (using a sophisticated Excel workbook), the ranking of each individual initiative moves up and down the list based on the scoring. Ballpark resource estimates are gathered from each functional area. Typically, the bulk of the resources are technology people.

The entire planning committee comes together several times to learn more about cross-functional initiatives and to prioritize the initiatives in the portfolio using a democratic voting process. PMO personnel spend many hours personally talking with the business leaders in other departments and influencing the portfolio to line up with the strategic goals of the organization. At the end of the planning cycle, we have a portfolio, which represents a roadmap for the organization, and have joined the strategic goals of the organization to the tactical annual plan.

Figure 20.7 is a snapshot of the criteria used to rank each initiative in the project portfolio. At the conclusion of the annual planning cycle, all of the initiatives will have been scored according to the same criteria. The portfolio will list the initiatives in rank order based on their final score.

20.7.1 Planning Reconciliation

In our most recent planning cycle we established some ground rules that helped us keep the process moving forward.

- Delivery of modernLINK (our multi-year Web initiative) will be the major focus and represents a major allocation of resources.
- All initiatives potentially impacting modernLINK will be closely managed to eliminate or cost-justify any impact.
- For partnerships and compliance activities, resource allocations were predefined based upon historical estimates.
- All active and carryover projects from 2006 will be regarded as first priority unless a more compelling justification is introduced.

The portfolio is dynamic and the relative priorities may change. New projects arise during the year, taking higher precedence over projects already in the portfolio. When this occurs, the voting process ensures that the ranking of all the initiatives in the portfolio is equitable and up-to-date. At the other end of the spectrum, a business sponsor may choose to abandon a proposed initiative in favor of other opportunities. This also results in a change to the portfolio's contents.

Inclusion in the portfolio does not mean an initiative is automatically approved for implementation. The business sponsor and project manager still need to obtain comprehensive development estimates from IT and schedule a discussion at the Project Review Committee.

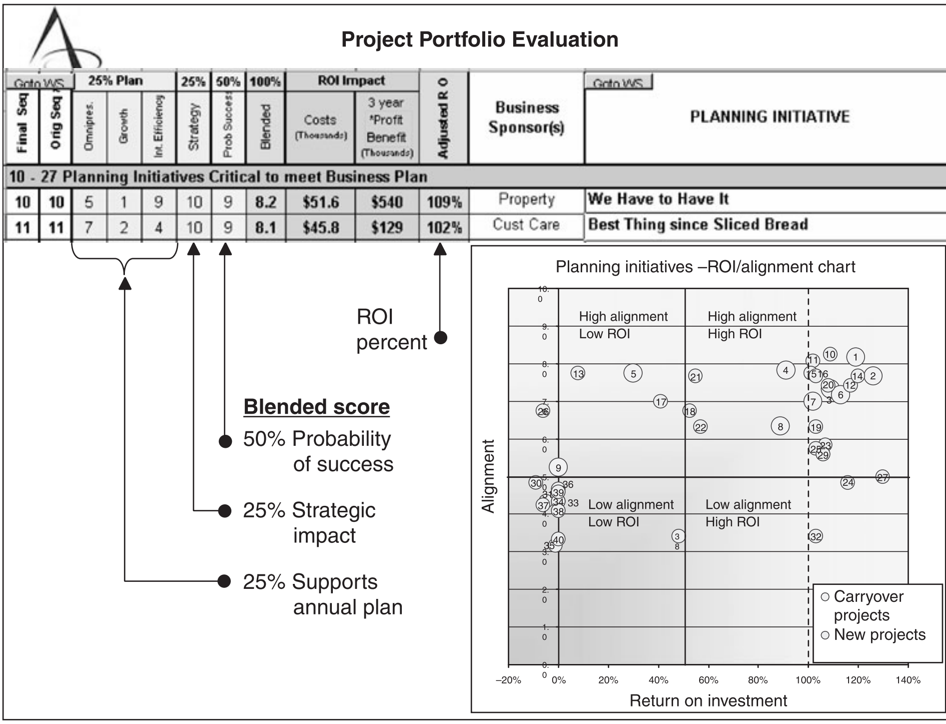

FIGURE 20.7 Factors used in evaluating projects in the portfolio.

20.8 PROJECT REVIEW COMMITTEE

At the conclusion of the annual planning cycle, the portfolio is turned over to the Project Review Committee (PRC) for approval, initiation, and execution. The PRC exists in order to ensure projects are dynamically categorized, evaluated, and prioritized to be both responsive to short-term business drivers and to support long-term strategic goals. The committee, which meets twice a month, consists of one or two senior-level representatives from each department at American Modern.

The PRC reviews the proposed projects in the portfolio and prioritizes new initiatives against the existing portfolio of active and pending projects. Every project requiring more than 10 hours of IT effort must be approved and prioritized by the PRC before work can begin. Once a project is underway, it is supported by a designated project team outside the scope of the PRC, and its resources are locked in. Active projects may carry over from one year to the next.

To initiate a project, the business sponsor, working in conjunction with a PMO representative, fills out two required forms—the Project Request and the Questions Affecting Development Estimates.

The first form is the *PRC Project Request,* and it captures a high-level summary of the project, including the following:

- Project Name
- Project ID
- Project Sponsor (Department and Person)
- Project Purpose
- Justification for Request

- Measurable Outcome
- Impact on modernLINK
- Impact on Audit/SOX
- Delivery Date Needed
- Expected Benefits (detailed analysis)
- Estimated Costs (both business and technical)
- Department Manager Approval
- Resources Required
- Project Manager

The next step pertains to estimating the IT development effort. The IT department develops detailed estimates of the technical work effort associated with implementing this project. A technical manager typically gathers the information, including a description of the necessary changes with all assumptions used to determine the estimated time. Using a standard template, the manager will document the technical deliverables, resource names, analysis/design hours, development hours, testing hours, etc. A standard checklist of questions provides guidance in developing the estimates and helps ensure that we do not overlook a system interface or technical dependency.

Once the forms are completed, the project manager sends them to the PRC chairperson and gets on the agenda for the next bimonthly PRC meeting. The PRC chairperson will e-mail all documentation to each PRC member several days prior to the PRC meeting so that each member has time to review the proposed projects.

Projects requiring less than 40 hours of IT development effort will be automatically approved unless someone objects. While the project sponsor does not need to present it at the PRC meeting, it still needs to be prioritized. If a PRC member disagrees with the proposed project, that member may request the sponsor attend the meeting to explain the project.

If the project requires more than forty hours of IT development, the project sponsor verbally presents the project background, purpose, and expected benefits at the PRC meeting. PRC members ask questions and discuss potential impact or benefit of a project that was not identified in the documentation. Typically, four to six potential projects are discussed at each PRC meeting.

Project approval at the PRC is only achieved through an approving quorum vote as defined as majority membership plus one. In our current organization, this translates to nine PRC members who must approve the project initiative, at which point it is added to the portfolio.

Occasionally, initiatives are withdrawn before a vote occurs in order to complete a more detailed analysis of benefit and/or cost. In such a case, the project will likely be presented with updated information at the following PRC meeting.

20.9 PROJECT PRIORITIZATION

When reprioritizing the portfolio of approved projects, the PMO must first obtain the prioritization within each department and then roll up all the votes to a master list. This reprioritization process occurs twice a month following each PRC meeting. After all projects have been presented, the primary representatives from each department confirm or change the priority of all pending PRC projects within their department. This does not include projects already underway; once started, a project is not taken off the "active projects" list, although competing projects could slow down the implementation. Each PRC member must vote on and submit their updated prioritization of all pending PRC projects within three business days following the PRC meeting.

The PRC chairperson (who is a project manager within the PMO) tallies all of the votes and sends out the updated prioritization list the next day. All projects that go through the PRC are tracked on a single document called "The Voting Sheet." At any time, the PRC Voting Sheet will display the current prioritization of all PRC projects. The IT department reallocates resources based on these updated priorities.

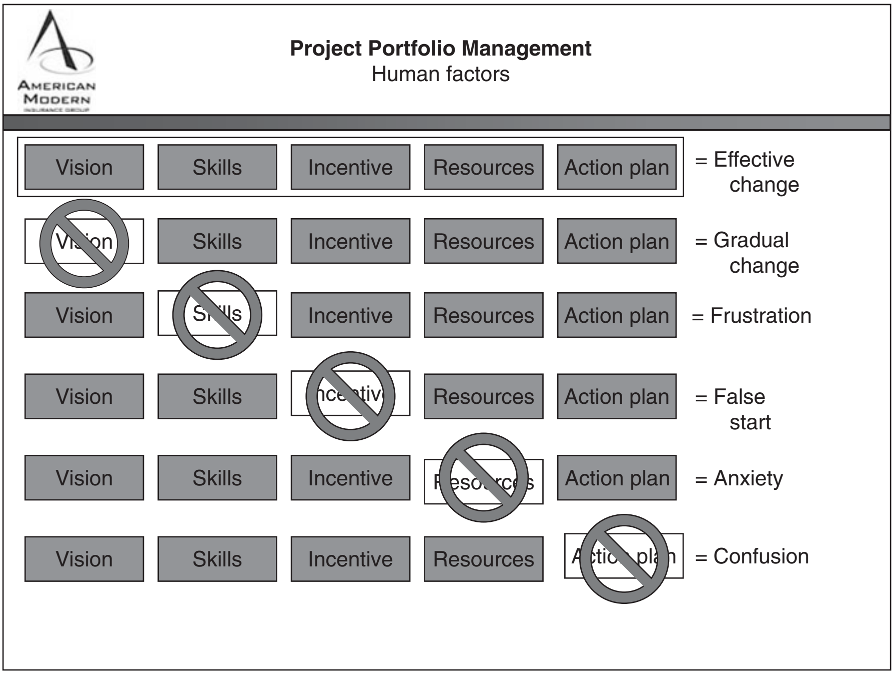

FIGURE 20.8 Impact of human factors on project teams.

20.10 THE ART AND SCIENCE OF PROJECT MANAGEMENT

Our success is rooted in the art and science of project management. A project manager who has mastered the tools of project management but doesn't understand the human factors will be less influential in guiding projects to their successful conclusion. At various points in the project life cycle, different communication skills need to be applied. Figure 20.8 shows the human factors influencing effective delivery.

Good project managers have strong intuition about what is going on with the project team and should always have their antenna up to hidden agendas. Ideally, our skills allow us to prevent problems before they endanger the project. While this is not always possible (especially in a matrix organization), it is important not to look the other way. Perhaps the team members need an incentive to work together and achieve common goals. If we notice anxiety among the team, perhaps additional resources are needed. If the team is unsure of which way to go, the PM must work with the other managers to get a clear plan of action. The project manager is a coach, a mentor, and a sounding board. In turn, we have built strong relationships with our sponsors and with leaders in a position to help us should we encounter difficulty.

20.11 IMPORTANCE OF THE BUSINESS SPONSOR

Business sponsors are very important to any project at American Modern Insurance Group. They are the connection to the business objective, and they help make the business goals tangible to the technology people. It's primarily the business sponsor that determines project scope and clarifies the business need, aided by the project manager.

At American Modern Insurance Group, we have found the formula or chemistry to capitalize on the connection between the business sponsor and the project. Without a sponsor, we have learned that you limit the success of your project.

A lot of our success has been due to the fact that we have sponsors who are so closely connected with our projects. What do they add to the project? One, they clearly represent the business alignment and what you truly want to accomplish through this project. Equating it to an automotive example, the sponsor is in essence the buyer of the car (where the car = project). What are the components of the car? How much do they want to pay for the car? When do they want it delivered? If you have the perspective of a sponsor, you can focus on the important components and make the appropriate trade-offs.

A good sponsor is in constant contact with the project manager and takes just as much accountability. We call this *mutual accountability.* One analogy used is that a good sponsor and a good project manager become partners. If one has a slight failure or something is not working right, the other will cover the weakness. They are strong allies and have a productive relationship. If two people are working for the same goal, this is clearly an advantage for the project, and the entire team benefits from the cooperation of the two leaders.

What we've experienced in some organizations is a sponsor who expects the project manager to do all of the work. When things don't go quite as well as expected, the sponsor points fingers. Some sponsors do not see the value of the PMO from the standpoint of coordination until they have active projects and see what PMO does. Then we usually win them over, and sponsors become ambassadors or advocates for the PMO.

The interrelationship of the business sponsor, project manager, advisors, and team members is shown in Figure 20.9.

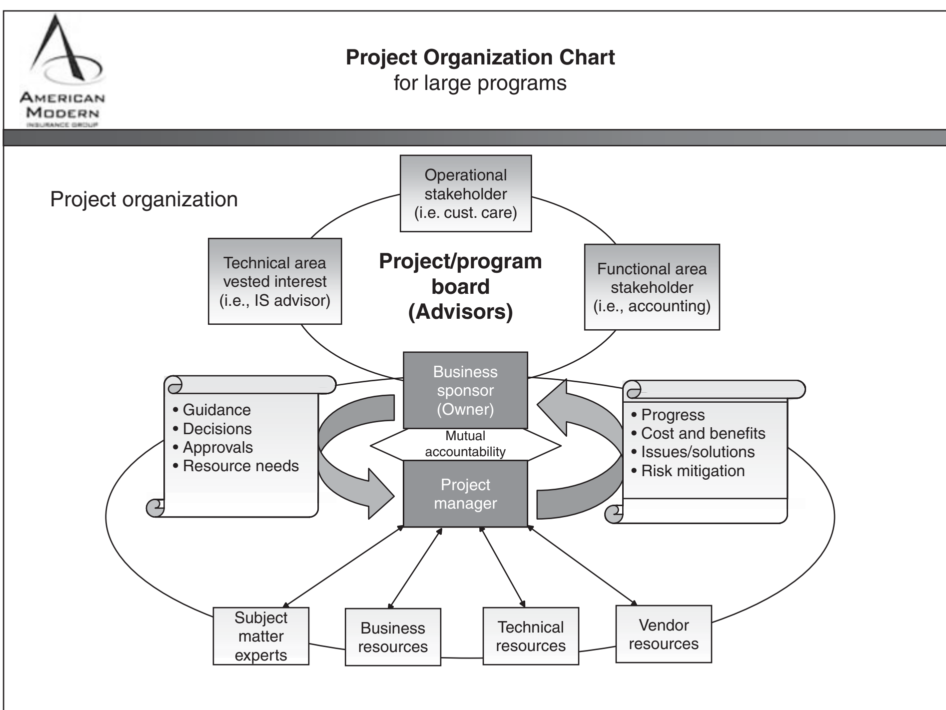

FIGURE 20.9 Typical project team structure.

20.11.1 What Constitutes a Good Sponsor?

What constitutes a good sponsor? First and foremost, a good sponsor is very engaged in the project on a day-to-day basis and takes responsibility for the triple constraint.

Sponsors in other organizations sometimes look at their role as that of project scope alone. One thing we've engrained at American Modern is that sponsors take responsibility for all three areas of the triple constraint. They take responsibility for the scope of a project, but they also recognize the cost factor and the schedule factor.

That happens in varying degrees. For the most part, sponsors do a good job with that. Occasionally, it happens where somebody may not be an active sponsor, and they look primarily at the scope portion of it, not helping with the trade-offs that are part of the package. But by and large, sponsors are really engaged. What encourages our sponsors is the support we get from the top. The organization's executive leadership really embraces the concept of what a sponsor does for a project. Sponsors are called upon to explain their business case to the various committees, whether that be the PRC or the Leadership Board. That builds in accountability. That accountability forces engagement, and the engagement creates a bond between the sponsor and the project manager. By being mutually accountable, sponsors know the best support they've got is through having a strong project manager who does the job very well. That drives alignment between the sponsor and project manager.

At the end of the project, sponsors are also asked to come back and share their perceptions: Have they seen their benefits on their projects? What would they do differently?

The value of active sponsorship on projects and what that means from the standpoint of project success can't be emphasized enough. Sponsorship in the project management world is underestimated today. The contribution of a sponsor can make or break a project. When you have good sponsorship, you have mutual accountability and shared responsibility. There's not enough emphasis on that from a project management perspective.

20.12 PMO FEEDBACK AND LESSONS LEARNED

To ensure that our PMO is headed in the right direction and serving the needs of our (internal) customers, we regularly solicit feedback from our project sponsors and participants. This enables us to understand how we are perceived by other departments within the company and to take steps to improve and simplify our processes. We have commissioned internal marketing surveys twice over the past five years to determine the effectiveness of our PMO.

We also gather team member feedback on how specific projects under our direction are going. We ask questions such as the following to let us know what we might possibly change from a process perspective:

- Do you understand the goals for the project and the roadmap to achieve those goals?
- Do you have the information needed to do your part of the project?
- Do you feel that you are kept well-informed on project details?
- Are you invited to all the right meetings?
- Do you feel that your participation counts?
- Are we resolving issues quickly enough?
- In order to improve the project, what should we do?
- What is going well?
- What would you do differently?

We study this feedback to understand the perceptions of our customers and take steps to improve our performance as internal consultants. We are measured by our effectiveness in helping the business achieve its goals and in delivering technologies to support those goals. Our compensation program is directly tied to these measures.

Our project managers utilize a formal process to capture "Lessons Learned" as part of our project close-out process. This process is jointly owned by the project manager and sponsor. Over the years, candid and constructive feedback has provided valuable input to the planning of future projects, especially as it relates to resource management, scope definition, and sponsor support.

20.12.1 What's Next?

The evolution of Project Office will take us further into our role as internal consultants. We will continue to develop our organization to be of more value to the business, not just in providing project management services but also as change agents. We need to be better at understanding how to do problem definition, voice of the customer, and benefits measurement/realization. We would like to play an advisor role on all project activity to ensure processes are used effectively and to look for the linkages between projects in the portfolio.

Project management is serious work. Our business success is directly related to our ability to effectively manage a portfolio of complex and interrelated projects. It is tiring work as well, as it's important to keep a sense of perspective as we go about building and managing our portfolio. Soft skills are probably the most important talents we bring to the workplace every day, and our ability to motivate team members in a matrix environment is crucial. To this end, we regularly have celebrations, awards, and appreciation days. Each person has a unique perspective and communication style and is motivated by a varying combination of factors. To help us maintain our perspective as project managers, we have some sayings:

- "Project Management is 30 percent tools and techniques and 70 percent soft skills."
- "Always think like you're the business owner."
- "As a business sponsor, the cost and benefits should be considered as coming from your own personal checkbook."
- "A fool with a tool is still a fool."
- "Bad news does not age well."
- "Our decisions are only as good as the information you give us."
- "There is no silver bullet."
- "Plan the work, work the plan."

P • A • R • T • 5

REMEDIAL PROJECTS

CHAPTER 21

A FAITH-BASED RESPONSE TO CATASTROPHIC DISASTER: AN OVERVIEW OF SOUTHERN BAPTIST DISASTER RELIEF PLANNING AND LOGISTICS IN HURRICANE KATRINA

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Having earned a degree in photojournalism at Western Kentucky University, Jim worked for four daily newspapers before entering vocational ministry in 1986 at the former Brotherhood Commission in Memphis, Tennessee. He served first as Baptist Men's editor before later becoming the director of Men's Ministries. The focus of his 20 years of vocational ministry has been the mobilization of the laity. A primary focus has been disaster relief. During this tenure, Southern Baptist Disaster Relief (SBDR) has grown from a few thousand volunteers to more than 70,000 volunteers and 900 mobile disaster response vehicles. SBDR is now recognized as one of the top three non-government disaster response organizations.

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21.1 INTRODUCTION

Beginning August 29, 2005, the United States discovered the depth of its inadequacies to respond to catastrophic national disasters. With the landfall of Hurricane Katrina slamming Louisiana Mississippi, and the entire Gulf coast and the subsequent levy failures in New Orleans—America's most disaster-vulnerable city—this nation's social failures and disaster preparedness shortcomings were suddenly exposed for examination by media, government, and citizens. Largely, the report cards were not good, often resulting in failing grades and much finger pointing. However, there were some bright spots that for many observers came as a surprise, much of which centered on the faith-based community of disaster responders.

For many in the faith-based community, Hurricane Katrina was their "coming out" party. With the exception of The Salvation Army (TSA), which has a history of more than 100 years of disaster response, the media was mostly unaware of other first responders such as United Methodist Committee on Relief (UMCOR), Seventh Day Adventists, Convoy of Hope, Operation Blessing, and Southern Baptist Disaster Relief (SBDR). Many reporters who called into the SBDR Disaster Operations Center (DOC) in Alpharetta, Georgia (an Atlanta suburb), upon learning the scope of services, asked the question, How long have you been doing this? The answer at that time was 38 years. While surprising to the secular media, it should not be surprising to realize that a fully-integrated, widespread response does not happen with an organization that just stepped into the disaster response arena. It takes years of experience, much gained through trial and error, to prepare more than seventeen million hot meals in one year to disaster victims.[1]

This chapter will focus on the organization, practices, and results of SBDR logistics and planning in light of Hurricane Katrina, the United States' worst natural disaster to date.

21.2 HISTORY OF SBDR

Southern Baptist Disaster Relief celebrates 40 years of service in 2007. The beginning of SBDR was modest. In 1967 when Hurricane Beulah struck the Texas coast, a group of Royal Ambassador leaders were having a campcraft training north of Houston led by Texas Baptist Men's Executive Director Bob Dixon.[2] Feeling a sense of urgency to help, Dixon loaded his Datsun station wagon and drove 600 miles to do what he could with what he had. What he had was basic camp-craft knowledge of how to cook on buddy burners, small ovens typically made out of coffee cans. With about 30 buddy burners made in the camp-craft training, he began cooking meals. That simple beginning of one man cooking on buddy burners out of his compact car has grown to now being able to prepare hundreds of thousands of meals per day.[3]

That simple and humble beginning marked the pattern of growth for SBDR in the early days. Small ideas grew rapidly into systems that could be replicated across the nation. By 1971, Southern Baptists had their first mobile disaster relief kitchen that eventually responded to both national and international disasters(see Figure 21.1).[4]

The initial SBDR activity originated with Texas Baptist Men. It was very much a grassroots effort, one that was soon replicated by other state Baptist conventions including Oklahoma, Louisiana, Mississippi, and Kansas-Nebraska.[5]

21.3 BEGINNINGS OF SBDR

By the late 1980s, SBDR had formed to the point that its potential was recognized by other disaster responders, including the American Red Cross (ARC).[6] In 1987, SBDR and ARC signed their first statement of understanding. This statement of understanding, negotiated by SBDR's first national director, Cameron Byler, led to rapid growth of SBDR as it became the primary provider of hot meals served by ARC. With the advent of national agreements and the growth of disaster relief in the state conventions, Southern Baptists looked to a national agency to represent them in national

FIGURE 21.1 Texas Baptist Men's leaders had assembled the first mobile disaster relief kitchen in the Southern Baptist Disaster Relief fleet.

agreements, multistate responses, and international responses. That agency was the former Brotherhood Commission, which was based in Memphis, Tennessee. In 1997, that agency was dissolved along with two other Southern Baptist agencies and reconstituted as the North American Mission Board (NAMB), which is based in the Atlanta area. The charter for NAMB includes coordinating national Southern Baptist disaster relief ministries.

In the early 1990s, Jim Furgerson, a former marine and Vietnam helicopter pilot, became the second national disaster relief director. He instituted a management system that has become a strength of SBDR. Furgerson implemented an annual Southern Baptist Disaster Relief Roundtable (DRRT). At this meeting each state Baptist convention had a seat at the "inner circle." While others from their state were allowed to participate, when it came time for decisions, each state convention had one vote, and it came from the "inner circle." By building consensus at this annual meeting, Furgerson gave the state Baptist conventions the platform to set the national agenda for SBDR. This is critical in Southern Baptist life. Just as SBDR's beginning was very spontaneous and grassroots, to this day the strength of SBDR is with the state Baptist conventions. Without the work done there, NAMB has no leverage in its national disaster relief coordination and facilitation role.

The background for this is the independent and autonomous nature of Southern Baptists. Unlike many denominations that are hierarchical, the Southern Baptist Convention is a compilation of churches that have separate charters, whose property is owned by the local church, whose congregations hire their pastor and staff, and who determine their strategies for ministry. None of this is dictated from a national agency. Instead, national agencies like NAMB exist at the pleasure of local churches, as do Baptist associations and state Baptist conventions. So how does such a grassroots organization become the second largest denomination in the United States with more than 46,000 churches, six seminaries, and more than 11,000 missionaries serving in the United States and abroad? It is done through a spirit of cooperation, best represented by the Cooperative Program.

Begun in 1925, the Cooperative Program is Southern Baptists' method for missions support. In essence, each church designates a portion of their undesignated offering receipts to be given

FIGURE 21.2 Southern Baptist Disaster Relief volunteers from North Carolina prepare to do line feeding for hurricane survivors in Mississippi.

through the Cooperative Program to support the state Baptist conventions, national agencies, colleges, seminaries, children's homes, and other ministries. This systematic stewardship eliminates personality-driven fundraising and allows more broad-based, strategic-driven objectives.

But the real key is the choice Southern Baptists make to cooperate freely with one another to accomplish objectives that are larger than any one congregation can achieve. This is very much part of Southern Baptists' "corporate culture," and SBDR provides an excellent example of that mindset.

The DRRT, under the leadership of Mickey Caison, the third national disaster relief director, helped facilitate the growth of SBDR while maintaining cohesion among the participating 42 state Baptist conventions. This growth has also been driven by the major storms and terrorist attacks the United States has faced since the early '90s (see Figure 21.2). As the needs have grown, so have the services of SBDR.

21.4 ORGANIZATION OF SBDR

A typical organizational chart of SBDR is a bit misleading as it is not a traditional top-down organization. However, for simplicity this explanation will follow that format (see Figure 21.3).

SBDR begins with volunteers who are members of local Southern Baptist churches. Recruiting and training typically happens in and through local churches and is led by the state disaster relief director, the director's staff, and/or designated trainers. More recently, some local churches are building mobile disaster relief units just as Baptist associations[7] and state Baptist conventions have been doing for some time.

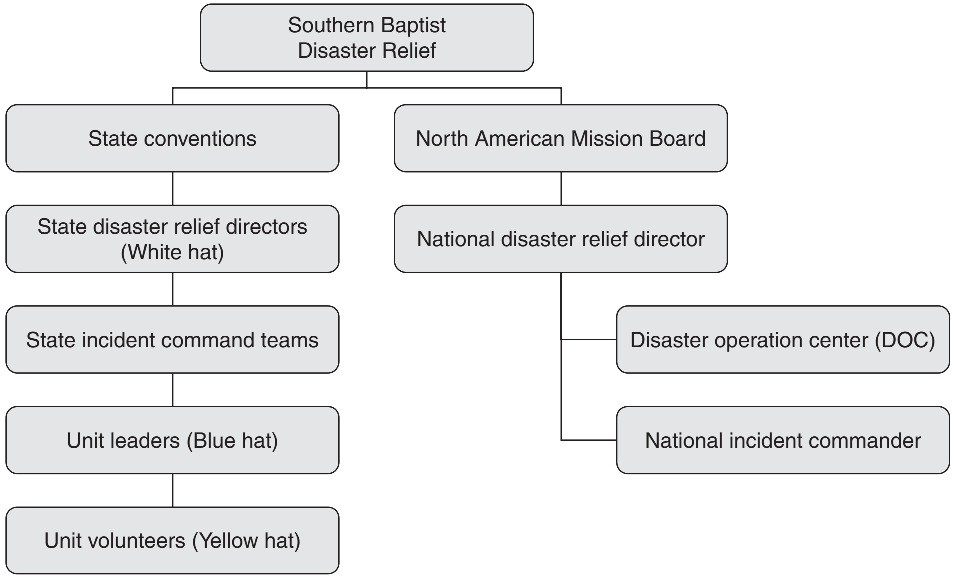

FIGURE 21.3 Southern Baptist Disaster Relief actually starts with volunteers from local churches. They begin their work as "yellow hats."

The core curriculum for every volunteer is titled *Involving Southern Baptists in Disaster Relief.*[8] This establishes the purpose of SBDR and much of the protocol that drives its coordination. Beyond the core curriculum, volunteers are then trained in an area of one of the following specialties:

- Mass feeding
- Cleanup and recovery
  - Chainsaw
  - Mud out
  - Blue-tarp roofing
- Communications
- Child care
- Showers
- Laundry
- Chaplaincy
- Water purification

Because training often takes place at the church or associational level, the state Baptist disaster relief director typically activates teams through the associational missionary or church pastor. This puts SBDR teams on the ground that have already worked with one another. Through the years they have built a cadre of shared experiences that help strengthen the SBDR community locally and nationally.

Each area of specialty has a chain of command. For instance, each mobile kitchen is considered a unit. Each unit has a unit leader, also known as *the blue cap*. The unit leader wears an actual blue cap with the SBDR logo. Anytime one needs to speak to the unit leader, one simply looks for the blue cap. The blue cap is surrounded by volunteers who wear yellow caps and are the backbone of SBDR. These are the many trained volunteers who cook the food, remove the debris, operate the shower trailers, care for the children, and perform other specialty services for disaster survivors. SBDR is best known by its volunteers who wear the yellow caps and yellow shirts.

Most operations activate more than one type of unit. For instance during the hurricanes in 2004 and 2005, when a feeding unit was activated, which is typically the first type unit assigned, each was instructed to bring shower, cleanup and recovery, and communication units. This is akin to activating an armada or brigade. For coordination among the different types of units coming from a state Baptist convention, there is an overall designated leader, also known as *the white cap*.

For intrastate disasters that a single state Baptist convention can manage itself, this is the structure that typically exists and answers to the state office. For multistate responses, SBDR often turns to an Incident Command System, which puts a management team in the field. Usually led by the national disaster relief director, this management team coordinates the work of the multiple state responders from throughout the nation as they place assets at the greatest point of need and supports those operations for the duration of the response.

Supporting the field operations during a multistate response is the Disaster Operations Center (DOC) at NAMB. Capable of expanding to more than 60 work stations with computers and phones, as many as 15,000 phone calls have been logged during some disasters. In the NAMB DOC, there are work stations for liaisons from ARC, TSA, the affected state Baptist conventions, and other partners. A state-of-the-art, Web-based disaster relief management software application helps manage the flow of information and coordinate the response.

The organizational structure, protocols, and procedures that have emerged in SBDR are defined in the *SBC Disaster Relief Operations Procedures Manual (DROP Manual)*.[9] A product of the annual DRRT, this 350-page manual defines how Southern Baptists do disaster relief and relate to key partners like ARC and TSA. It is through the *DROP Manual* that state Baptist conventions define NAMB's role and its empowerment during multistate and international responses. Consequently, with the agreements reflected in the *DROP Manual*, SBDR leaders can negotiate with other emergency management agencies from a position of strength.

21.5 PRE-KATRINA LANDFALL

Most disasters, such as tornadoes and earthquakes, give responders very little notice. Among the few advantages to a hurricane response is that there is time to ramp-up preparation for an impending landfall.

Such was the case with Hurricane Katrina. As the nation watched in anticipation of a Category Four land strike, Terry Henderson, SBDR's national director, had opened the DOC and put the entire network of Southern Baptist disaster relief volunteers on alert. By Saturday before landfall on Monday, ARC had estimated the need for three-hundred-thousand meals a day—to provide that capacity became the mandate of SBDR.

Early Sunday morning the DOC became a beehive of activity. The objective was to meet the ARC request as efficiently and effectively as possible. That meant scoping the entire network of SBDR vehicles to determine how best to activate units. Generally, decisions were made based upon capacity and proximity of available kitchens.

SBDR has four kitchen-class designations: A, B, C, and D. These designations represent the following capacities for meal preparation:

- Class A—Up to 5,000 meals per day
- Class B—Up to 10,000 meals per day
- Class C—Up to 15,000 meals per day
- Class D—Up to 20,000 or more meals per day (see Figure 21.4)

Units range from single-axle trailers pulled by pickup trucks to tractor-trailers. Perhaps more than the size of the trailer, the capacity of units is determined by their equipment. Some of the mobile units are equivalent to a major commercial kitchen as found in full-service hotels or institutions. Typical equipment includes tilt skillets (see Figure 21.5), convection ovens, deep fryers, pneumatic can openers, and on-demand water heaters.

FIGURE 21.4 The Mississippi Baptist Convention Board's Class D kitchen operates outside Yankee Stadium in Biloxi, Mississippi.

FIGURE 21.5 A Southern Baptist Disaster Relief volunteer from Oklahoma stirs vegetables in a tilt skillet.

On Sunday, 20 feeding units were activated, each traveling with an entourage of support units. Most had a specific site assignment before they left home, while others were pointed toward staging areas awaiting further directions. The goal was to have the units close to their assignment on Monday—but out of harm's way—before arriving at their assignment after the storm later that day and on Tuesday. Feeding was scheduled to begin by Wednesday. Each mobile kitchen arrived with an inventory of 20,000 meals.

21.6 POST-KATRINA LANDFALL

By Monday afternoon after Katrina had plowed into the coast, many of the preassigned sites were heavily damaged or destroyed. While the preplanning was not in vain, most everything had to be reworked. Fifteen sites were reassigned. Making the reassignments was difficult, as decision makers from the newly selected churches had scattered and were difficult to contact. Despite this, many units were in place and preparing meals by Wednesday, and most in the initial call out were cooking by Thursday.

Once a work site has been established, it becomes a base of operation for each type of unit that travels with the kitchen. The kitchen provides essential support for the volunteer operations and for survivors in the community. Soon the cleanup and recovery crews, shower trailers, laundry trailers, and communication units are also operational. The cleanup crews, doing mostly chainsaw work in Katrina, begin taking job orders from residents and fulfilling them as quickly as possible (see Figure 21.6).

FIGURE 21.6 A Southern Baptist Disaster Relief volunteer from Kentucky removes a downed tree from a home in Brandon, Mississippi.

Once established, it did not take long to exhaust the initial food inventory. The challenge then became supply-chain logistics.

21.7 MAINTAINING RECOVERY IN KATRINA

Besides statements of understanding with ARC and TSA, SBDR also has a close working relationship and statement of understanding with the Federal Emergency Management Agency (FEMA). While ARC and TSA typically purchase the food cooked by SBDR from commercial vendors, free enterprise does not always meet the need in the early chaotic days of a disaster. It is not unusual for SBDR kitchens to literally wipe out the warehouses of commercial vendors. The backup plan is USDA food, and FEMA facilitates access to these inventories for ARC and TSA in accordance with Emergency Support Function Six (ESF6) of the National Response Plan.

In anticipation of this demand, FEMA requires a Time Phased Force and Deployment List (TPFDL), which is the order form for mobile kitchens. The objective is to request the first replenishment of inventory before leaving home.

Systems work when people work the systems. In Katrina, the system failed in the early days. Among the early challenges faced was the depletion of food inventory in Mississippi without adequate resupply. Not only was this frustrating for SBDR cooking crews, but it also created serious security issues. When survivors are hot and hungry and they see a huge mobile kitchen, they expect it to produce food. The SBDR mobile kitchen blue caps had to resort to scrounging for local, nontraditional food sources. This included securing remaining inventories of food from grocery stores. One blue cap purchased $25,000 of food from a local mega store. The creativity of SBDR leaders in the field salvaged the situation until the supply chain could be reestablished.

At least two factors caused the supply-chain snafu. One, the TPFDL forms filed with FEMA got stuck on someone's desk. There was very slow follow-up. Two, one of the major commercial suppliers had arbitrary rules about their trucks crossing state lines because of territorial coverage strategies that determined their normal work patterns. Consequently, there were truck loads of food that stopped at the Alabama state line, refusing to enter Mississippi because of company policies. The log jam broke loose through intervention by upper-level ARC leaders. Within a week, most of the supply-chain issues had been resolved.

Eventually, SBDR established 38 kitchens in Alabama, Mississippi, and Louisiana. From these bases of operation, ARC emergency response vehicles (ERVs) and TSA canteens delivered hot, balanced meals cooked by Southern Baptist disaster relief volunteers into dozens of communities including New Orleans. These mobile vehicles carried cambros, which are large insulated containers of hot food. The meals were served in Styrofoam "clam shells" at the point of delivery. SBDR kitchens also operated walk-up and drive-up food service to survivors.

Supporting volunteer operations is one of the largest logistical challenges in a disaster response. Typically, SBDR sets up at a church, and the volunteers spread bedrolls in the classrooms, gymnasium, or sanctuary. Porta-johns and mobile shower trailers provide other essential support. Some of the operations during Katrina were so large and the host sites had so much damage that there was not enough room for volunteers. One night the DOC received a report that more than 100 volunteers were sleeping on the ground in Gulfport, Mississippi. An immediate search began for large tents and portable air conditioners to support the volunteers there, thus opening a new dimension of SBDR—portable, short-term housing solutions.

As daily challenges continued with the Hurricane Katrina response, the coast faced a second threat—Hurricane Rita. During the 2004 hurricanes in Florida, SBDR had twice evacuated the state, moving all its assets to staging areas in Georgia, to dodge the back-to-back hurricanes. Evacuations clearly represent a serious disruption of services, but exposure of assets to risk must be avoided. In addition, assets must be freed up to respond to the next incident.

With the advent of Hurricane Rita, NAMB's DOC coordinated the evacuation plan, established the staging areas, and made prestrike assignments for the impending response. Following Hurricane Rita's landfall, SBDR redeployed kitchens to western Louisiana and east Texas while some kitchens returned to their assignments in the Katrina response.

21.8 LESSONS LEARNED—KATRINA DEBRIEF

The enormous challenge of recent disasters, beginning with 9/11, has led SBDR leaders to hold debriefs in December or January following the initial event. The debrief for Hurricanes Katrina, Rita, and Wilma occurred December 1–2, 2005. Since recent experiences were fresh in the minds of leaders, this national debrief served as an excellent course correction for improving SBDR.

The debrief participants, which included TSA, ARC, and FEMA, addressed the following areas of service.

21.8.1 Child Care

Temporary emergency child-care services were one of the first areas of Southern Baptist disaster relief. Like mass feeding, it emerged out of Texas. By the mid '80s, Karl Bozeman, children's specialist and Royal Ambassador leader with the Baptist General Convention of Texas and later the Brotherhood Commission, designed a "nursery in a box." This special trailer was efficiently equipped with shelving and storage that held toys, changing tables, and necessary inventory for the care of children. The objective was to place these emergency child-care teams near Disaster Assistance Centers where parents would go to begin the paperwork process for financial assistance. These parents would have the option of not having to carry their children with them through long lines.

In recent years, this ministry had been underutilized as states focused more on other areas of service. However, with the advent of huge shelters in Louisiana and Texas at major arenas, this service experienced a rebirth.

Action points included the following:

- Create faster and better assessment for child care, including assessment of unsafe environments within the community. Knowing that children need to feel safe and secure following a disaster, this is an area of prioritization. This type of assessment will likely invoke more activation by SBDR emergency child care.
- Prepare child-friendly meals. Currently, the mobile kitchens typically prepare one type of meal for lunches and dinners. These meals do not always meet the needs of children.
- Reestablish with FEMA and ARC that temporary emergency child-care services are available for their centers and shelters.

21.8.2 Communications

Since the early days of SBDR, operations have been supported by a communications unit. Before cell phones, this was typically a converted recreational vehicle with business band and ham radio equipment. Today, there is often an antennae that boosts cell phone signals, and a growing number of these units have been and will be adding satellite uplink capacity.

Action points included the following:

- Establish NA4MB, a licensed ham radio address, as a fully functioning communication center with direct access to the NAMB DOC. Likewise, identify and train a dedicated communications person working from the NAMB DOC.[10]
- Include a communications officer with the field incident command teams.
- Assign a communications advisory/leadership team to direct these services.
- Establish standard skill sets and operational standards for all states.

21.8.3 Chaplaincy

Following the terrorist strikes of 9/11, Southern Baptists realized an increased need to address spiritual and emotional needs following disasters. While there had been some progress with this among some state Baptist conventions, there was no unified strategy or national training standards.

Action points included the following:

- Create a reporting format to document contacts by chaplains and outcomes.
- Standardize and upgrade chaplaincy training materials.
- Place a chaplaincy liaison in the incident command field office.

21.8.4 The Salvation Army

A partnership between TSA and SBDR emerged following 9/11. TSA has one of the highest profiles in disaster response and an admirable track record of response to local disasters such as house and apartment fires. This has happened through their local churches, called corps, and typically have been small scale. Like most disaster response agencies, events over the past 10 years have stretched and escalated the presence of TSA. Among the strengths of TSA is their ability to raise money and their good reputation in this culture. Among the strengths of SBDR is the depth of its volunteer base. TSA had established kitchens at Ground Zero and on Staten Island. A healthy partnership emerged as SBDR mobilized hundreds of volunteers for approximately 10 months to help operate those TSA kitchens.

TSA has since acquired mobile tractor-trailer kitchens. These are typically manned by SBDR volunteers. As the relationship between TSA and SBDR has grown, it has often mirrored the services of ARC and SBDR. However, the standards and processes have not always been the same. Consequently, SBDR has worked with ARC and TSA to create a common standard related to kitchen locations, serving sizes, and other protocol issues.

Action points included the following:

- Create orientation for SBDR volunteers to help them better understand TSA's organization.
- Create a combined TSA/SBDR training module that includes cross-training SBDR volunteers for TSA canteens and large TSA mobile kitchens.
- Continue liaison development between TSA and SBDR, including the coordination of public relations at service sites.

21.8.5 Cleanup and Recovery

This phase of SBDR is growing the most rapidly. Besides the essential services provided by chainsaw, mud-out, and blue tarp crews, these teams enjoy the extended personal contact they often have with disaster survivors.

The teams typically receive job orders at the feeding site when homeowners come for food. In the early stages before this level of organization can be established, crews will often start going down residential streets seeking homeowners and asking for written permission to assist. The standard question they get is, How much will this cost? For most homeowners, it is hard to believe the services are free.

With chainsaw crews, the objective is to get the fallen trees off the house, out of the yard, and pulled to the curb for the city or county to haul away. Depending on the degree of damage, this can take up to two days per job.

Mud-out work creates a special set of challenges, beginning with health issues. Floods are potentially the most dangerous environment for disaster responders and require special care. Often, these crews engage in pumping water out of flooded basements. In the Katrina response, there were virtually no basements. Instead, water had flooded one- and two-story homes. With these, the objective is to remove all water-damaged items including furniture, clothes, and books so they can be discarded if there is no possibility of salvage. Next, mud is shoveled out of the houses, and drywall and insulation are torn out to one foot above the flood line. The water-damaged areas are then treated with a disinfectant and left to dry so that rebuilding can eventually begin.

The ever present blue tarps are a growing area of service. These are typically provided in mass by FEMA and installed in large part by volunteers. Clearly, it is a temporary but necessary fix to reduce additional rain damage.

Action points included the following:

- Improve efficiency of response by securing software that maps and lays out jobs in a designated area.
- Separate feeding and recovery volunteers in the housing quarters. Feeding volunteers arise as early as 4:00 A.M. to begin cooking while recovery volunteers start their day later.
- Produce a larger and more balanced breakfast for recovery volunteers. The SBDR kitchens often do a light breakfast just for the volunteers while preparing large quantities of food for lunch and dinner delivery to the community. The recovery volunteers burn a lot of calories and need a larger breakfast than just cereal.
- Standardize safety requirements for all responding state teams. Though standards have been established, they can be difficult to maintain. Given the safety issues with recovery, this is an area that the state directors agree must be shored up. For chainsaw crews, the standards include a helmet with safety face shield and ear protectors, safety glasses, heavy-duty gloves, and chaps, which cover the legs. For mud-out crews, N95 masks, tyvex suits, and rubber gloves and boots are among the items each volunteer should use.
- Bring blue sheeting when activated. Just as feeding units arrive with an inventory of food, the recovery units plan to arrive with blue tarp inventory so work can begin sooner than in the past.

21.8.6 Incident Command System

While the Incident Command System has been utilized by public sector agencies for many years, it is relatively new to SBDR, having been instituted in 2002. While its role is growing, there is often confusion during a disaster about who is in charge—the affected state disaster relief director, the ICS team, or the NAMB DOC.

All disasters are local, a reality that is reflected in government and nongovernment response plans. Consequently, the needs as defined by the affected state disaster relief and local leadership take priority. In turn, the incident command team manages according to those defined needs and expectations. In the background the NAMB DOC is working to fulfill those decisions, many of which involve the activation and rotation of teams at an established ministry site.

During major disaster responses, the NAMB DOC conducts a daily conference call with the state Baptist disaster relief directors. The purpose is to report information and facilitate communication/coordination. The calls are led by the DOC manager with input from the incident command team, affected state leadership, and key partners. The facilitation role of the NAMB DOC and its responsibilities in unit activation have led some to conclude that NAMB manages disasters from its headquarters in the Atlanta area. The White House report following Katrina documented similar confusion in the government sector. While the federal government expresses a commitment to support local responses, the ability of communities and states to effectively manage disasters varies greatly. Consequently, the federal government feels a need to be able to fill each and every gap that might exist on the state and local level.[11] Nationwide, citizens are most likely to look first to FEMA for help and accountability, as most are unaware of local and state emergency management roles in disasters. The tension felt between local, state, and federal response agencies is not dissimilar to what is sometimes experienced in SBDR. However, in the event of failures or shortcomings in a disaster response, the reflection is often on SBDR, not a state Baptist convention, and the objections consequently come to NAMB. Despite the concerted efforts to build a cohesive system through the DRRT and *DROP Manual*, planning and understanding does break down in the heat of a response.

Besides the age-old axiom that all disasters are local, another saying applies—change is inevitable. As Southern Baptist disaster services have grown over the past 40 years, so has the complexity and expectation of those services. While we continue to learn through trial and error, there are growing pains that require attention.

Action points included the following:

- Continue to clarify the role of states, incident command teams, and the NAMB DOC during major disasters.
- Rotate incident command teams in phases. There was a tendency to rotate entire teams, including multiple positions, at the same time. For the sake of continuity, future incident command teams may be rotated by position so that the handoff from one to the other is smoother.
- Support incident command teams with dedicated communication units. In Katrina, land lines and cell towers were very sporadic. The goal now is to have a satellite-equipped NAMB vehicle that can work from the incident command base of operation and provide voice, high-speed data, and at least some local cell coverage.

21.8.7 American Red Cross

The relationship between ARC and SBDR has often been described as one of America's best examples of a nonprofit strategic alliance. While one is a civic and the other a faith-based organization, they have similar objectives related to mass care. ARC has a congressional charter dating to 1905 to lead this nation's disaster recovery efforts.[12] With the formation of the National Voluntary Organizations Active in Disaster (NVOAD) in 1970, ARC relates to a host of nongovernmental organizations (NGOs) that now make up the disaster response community.[13] To be effective in disaster response services, it is imperative to have a healthy, working relationship with ARC.

ARC's primary duties in mass care are feeding and sheltering. They also do case work, as does FEMA, TSA, UMCOR, and others, with information being shared between these agencies through the Coordinated Assistance Network (CAN) to reduce duplication of effort.

To facilitate the mass feeding partnership, SBDR sends a liaison to ARC's DOC in Washington, DC, and ARC assigns a representative to the NAMB DOC. This simple arrangement has greatly enhanced the communication and, in turn, the logistics planning between the two agencies.

Still, given the enormity and complexity of a response like Katrina, there were gaps that emerged, including the supply-chain challenges mentioned earlier in this chapter and the breakdown of communication up and down the line. While the national relationship between the two agencies is healthy and growing, many ARC chapter volunteers are unaware of the national agreement. Consequently, when a disaster becomes local they do not always know how to work with the swarm of yellow caps from SBDR. Realizing SBDR's growing role in disaster response, ARC's Board of Governors developed a new strategy called "The Way Forward."[14] The essence of this plan is to train every ARC chapter executive director in disaster services so that the skill set will exist locally to manage disasters. Aligned with this is ARC's desire to strengthen its partnerships locally and nationally in such a way as to empower those partners to be successful in disaster response. This robust plan will eliminate some of the systemic communication problems experienced previously.

Action points included the following:

- Develop a process of first and second food orders and what they should be. This will include asking kitchens to arrive with up to 60,000 meals in their initial inventory, which will require protocol adjustments concerning availability of dry box and refrigerator supply trailers.
- Cross train ARC and SBDR kitchen volunteers, and combine the agencies' core curriculum for kitchen training.
- Develop opening and closing protocols for service areas, chapters, and disaster operations.
- Label cambros to designate the product inside, temperature, time, kitchen, ERV number, serving size, etc.
- Retrofit all ERVs with sign holders that communicate the partnership between ARC and SBDR, and stock partnership signs on the feeding units.

21.9 CONCLUSION

Disaster relief is an inexact science. For planners who like to nail every detail down months in advance, this might not be the right line of work. Even with statements of understanding, *DROP Manuals*, and years of experience, the challenges of a disaster vary with every incident. As much as planners like to rely on protocol, sometimes there are exceptions. As the United States looks forward to how it responds to future disasters, beyond the issues of training, partnerships, and protocol, the larger objective should be to increase service capacity as determined by volume and skill set. By volume is meant how much can we do in terms of evacuation, sheltering, feeding, medical, etc. How do we assure that volume can be met post disaster in Enid, Oklahoma and New York City? By skill set is meant greater integration of training among decision makers so they understand available capacity, assets, and efficiencies. This integration must cut across government and nongovernment lines and must include the faith-based community, which has firmly established itself as a primary disaster service provider. While the necessity of service integration among multiple agencies is better understood, it behooves each member of the disaster response community to consider its capacity, just as ARC has done in "The Way Forward."

So how has SBDR grown in capacity since Hurricane Katrina? Again, the answer begins in the state Baptist conventions. During 2005, the states trained 20,000 volunteers. By December 31, 2006, the total number of SBDR volunteers had grown to more than 70,000. The number of mobile disaster relief units built by churches, associations, and state conventions increased by approximately 400, bringing the fleet size by December 31, 2006, to more than 900.[15] These units are built and funded locally.

NAMB has also examined its role in disaster response and worked to increase its capacity. This has included training more volunteers in the incident command system as well as purchasing sophisticated Web-based disaster relief management software that allows the NAMB DOC and state Baptist conventions to keep track of resources, personnel, and equipment, and to mobilize and track units during a response, log daily activity, generate reports, and manage the many aspects of a disaster response from one database that can be accessed by multiple users simultaneously around the country.

For SBDR, Katrina was a landmark event, and the results were clear and measurable.

- Meals prepared 14,556,541
- Homes/buildings repaired 16,973
- Children cared for 7,817
- Showers provided 103,556
- Laundry loads 25,826
- Ham radio messages sent 3,107
- Volunteer days 165,748
- Gallons of water purified 21,595

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1. This number covers all 2005 responses by SBDR, including Hurricanes Dennis, Katrina, Rita, and Wilma.
2. Royal Ambassadors is a trademarked name for Southern Baptists' church-based mission education program for boys. The curriculum includes camp craft.
3. *Involving Southern Baptists in Disaster Relief: Serving Christ in Crisis* (Atlanta: North American Mission Board, 2004) page 7. This is available under www.namb.net/dr manuals and resources.
4. *Involving Southern Baptists in Disaster Relief: Serving Christ in Crisis*. (Atlanta: North America Mission Board, 2004) page 3. This is available under www.namb.net/dr manuals and resources.
5. The Southern Baptist Convention has 42 state Baptist conventions. Some of these have multiple states in their convention. Canada and Puerto Rico are also considered Baptist conventions.

6. *Involving Southern Baptists in Disaster Relief*. Page 9.
7. A Baptist association designates an area of churches that choose to associate and work together in their community. Most often, these associations fall along county lines though some cover as many as 1,000 square miles. In the Baptist Convention of New England, each of the six states is an association. There are 1,200 Southern Baptist associations in the U.S. and Canada.
8. *Involving Southern Baptists in Disaster Relief*. This is available at www.namb.net/dr under manuals and resources.
9. *SBC Disaster Relief Operational Procedures Manual* (Atlanta: North American Mission Board, 2002).
10. In previous disasters, either temporary quarters were established for ham radio operators at NAMB or they worked from their home to call in messages. From this point forward, they will have a workplace at the NAMB DOC.
11. *The Federal Response to Hurricane Katrina: Lessons Learned* (Washington: The White House, February 2006). Page 11. http://www.whitehouse.gov/reports/katrina-lessons-learned/
12. *Congressional Charter of the American Red Cross* (Washington: The American Red Cross). http://www.redcross.org/images/pdfs/charter.pdf#search=%22American%20Red%20Cross%20charter%22
13. National Voluntary Organizations Active in Disaster, 1720 I St., NW, Suite 700, Washington, DC 20006. www.nvoad.org. SBDR is a charter member of NVOAD.
14. The author testified before the ARC Board of Governors on March 8, 2006, in response to this plan.
15. NAMB takes an inventory once a year of state Baptist convention activity in these areas. This happens in the first quarter to document the previous year's training and new unit activity.

CHAPTER 22
THE FIREFLY FIASCO: A CASE STUDY IN PROJECT MANAGEMENT FAILURE

Dr. Bud Baker

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Prior to coming to Wright State University, Dr. Baker spent more than two decades as a United States Air Force officer. There, he served as a transport navigator, Minuteman missile launch crew commander, Strategic Air Command staff officer, and U.S. Air Force Academy professor. His last Air Force assignment was with the B-2 Stealth Bomber program, where he served as B-2 production program manager, Chief of Program Integration, and Executive Officer to the B-2 Program Director.

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22.1 INTRODUCTION

The announcement from the U.S. Air Force's Air Education and Training Command received little notice, and perhaps it was intended that way: In a press release dated September 11, 2006—the fifth anniversary of the attacks on the World Trade Center and the Pentagon—the Air Force announced the planned destruction of an entire fleet of training aircraft. None would be saved for further test flight, none would go to aviation museums, and none would be sold as surplus to the public. In the weeks to follow, all 110 of the service's T-3 Firefly trainer aircraft would be destroyed and their remains sold for the scrap value of their metal parts.

If the Air Force *was* trying to bury the news by releasing it on the fifth anniversary of 9/11, the strategy would be understandable: It was an ignominious end for an ignominious project. The Air Force had spent $40 million on an ill-advised effort that was largely the vision—some would say whim—of its most senior leader, and the result was a tragic string of accidents and fatalities. Following three fatal crashes and six deaths, the Fireflies had been grounded and had been gathering dust in Hondo, Texas, since 1997 ("Officials announce T-3A Firefly final disposition," AETC News Service, Sept 11, 2006).

Wheels normally turn slowly in the governmental bureaucracy, but not in this case. Within just two weeks of the announcement, the deed was done: All 110 Fireflies were destroyed and sold for scrap, despite furious opposition from people who believed that the aircraft should have been made available to the public or at least disassembled and sold on the spare parts market. The Air Force disagreed, citing issues of legal liability and public safety. According to a Pentagon spokesman, the decision was “regrettable but prudent. . . . Overall, we found that this aircraft was inherently unsafe. We deliberated long and hard over this issue” (Destruction of Firefly planes angers some, San Antonio Express-News, Sept 26, 2006).

Longtime observers of the T-3 program must have been struck by the irony that the Air Force had “deliberated long and hard” over the decision to scrap the Firefly. Had the Air Force “deliberated long and hard” 15 years earlier when the project began, the whole Firefly fiasco could have been avoided.

22.2 ON THE NATURE OF PROJECT FAILURE

Evaluating the success of projects is not a precise science. Examples of project ambiguity abound. Immediately postlaunch, the Hubble Telescope was seen as a sort of national joke, a case study of project failure. Yet today NASA is planning a rescue mission to allow the Hubble to survive long beyond its planned lifetime, as the telescope continues to reveal incredible views of the heavens, views unobtainable from any other source. At its completion, the Sydney Opera House was seen as a stupendous failure: a music hall with poor acoustics, stunningly over cost and behind schedule. Decades later, that same structure is a unique national treasure, its massive cost and schedule overruns long ago forgotten. Who would see it as a failure today?

On occasion, though, a project ends in such a manner that there can be no doubt about its failure. The United States Air Force’s effort to acquire the T-3A Firefly trainer aircraft is such a case. The Firefly was to improve the screening process for pilot candidates, saving money while helping the Air Force produce more skilled pilots. The results proved to be different: a total loss of the $40,000,000 investment, an actual *reduction* in the Air Force’s ability to select pilots, significant damage to the Air Force’s reputation, and, worst of all, the deaths of six young men.

22.3 BIRTH OF THE FIREFLY PROJECT

The Air Force has used small aircraft to screen pilot candidates for more than a half-century. The rationale for such screening is primarily economic: not all pilot candidates have the necessary motivation, aptitude, and skills to fly high performance military aircraft. Therefore, the earlier such candidates can be identified and eliminated from training, the less time, money, and resources is wasted upon them (Broad Area Review, 1998, 2). In the mid 1960s the Air Force chose a single-engine Cessna, designated it the T-41, and made it the primary flight screening aircraft. The always-reliable but never-glamorous T-41 did its job well for the next 30 years, despite the inability and inexperience of thousands of student pilots over three decades, not a single fatality occurred in T-41 operations.

By the late 1980s, though, some in the Air Force claimed that the T-41 needed to be replaced. The old Cessna could not handle—nor was it ever designed to handle—the high stresses of aerobatic flight. And such aerobatics were deemed necessary by senior Air Force leadership as “a means of evaluating a candidate’s ability to react quickly and accurately while flying more complex maneuvers representative of follow-on trainers and operational USAF aircraft” (Broad Area Review, 1998, 3).

The Air Force Chief of Staff at the time, himself a former fighter pilot, was a strong proponent of replacing the T-41. In a glib remark, which would become more widely reported when fatalities began to occur, he claimed, “The T-41 is your grandmother’s airplane. Our mission is to train warrior-pilots, not dentists to fly their families to Acapulco” (The deadly trainer, 1998).

Not everyone shared the general’s views. Most Air Force pilot training graduates do not move on to highly maneuverable fighter/attack aircraft but rather to heavier, more stable platforms—bombers, refueling tankers, cargo jets—where the spins, loops, and rolls of aerobatic flying are not exactly routine. Others thought that USAF leaders were losing sight of the mission: the purpose of these aircraft was only to *screen* prospective pilots, not to *train* them. The training would come later, in other aircraft, after the initial screening. In the words of one instructor pilot:

> A common question at the time was "Why are we spinning students during flight screening? The plane was simply a *screener* to determine who qualified to enter Undergraduate Pilot Training . . . We wondered why spinning and advanced acrobatics were involved in an aircraft designed to screen applicants. Some of us had a philosophy that functioning in a flying pattern and being able to land an aircraft solo was enough criteria to determine who should progress to pilot *training.* (*The making of a trainer, 1998*)

22.4 THE FAILED PROJECT STRATEGY: "COMMERCIAL OFF-THE-SHELF . . . SORT OF . . ."

With the backing of the most senior Air Force leader, and in spite of the concerns of others involved in the project, the acquisition of the new aircraft, by then called the Enhanced Flight Screening Program (EFSP), proceeded. One of the first decisions involved acquisition strategy.

A number of aerobatic-capable flight trainers existed throughout the world, so the Air Force decided to select one of these rather than to develop a new aircraft from scratch. This would allow the new trainer to reach the field earlier than a freshly developed craft and at a lower cost—at least in theory. This strategy, generically known as "commercial off-the-shelf (COTS)" was approved, indeed encouraged, by the Department of Defense (DoD):

> Market research and analysis shall be conducted to determine the availability and suitability of existing commercial and non-developmental items prior to the commencement of a development effort . . . Preference shall be given to the use of commercial items . . . The overriding concern is to use the most cost-effective source of supply throughout a system's life cycle. (*DoD Regulation 5000.2-R, 2000, para. 3.3.2.1*)

Commercial items tend to cost less because there is not so great a need to do extensive testing and evaluation, since such was presumably already done when the product was introduced commercially. Still, the Enhanced Flight Screening Program moved ahead at lightning speed—by Air Force acquisition standards. The directive authorizing the project was released in July 1990, with initial flight demonstration by seven competing manufacturers held during the next month. One of the competitors was the Firefly. Offered by Slingsby Aviation, Limited, of England, it was judged to be underpowered, slow to climb, and had the lowest cruising speed of any of the competitors. Brake effectiveness was poor, seating adjustments difficult, and visibility was limited both over the nose and over the low-mounted wings. But handling earned the Firefly higher marks, with both overall stability and responsiveness judged to be very good (Broad Area Review 1998, 14).

Over the next year a fateful development occurred; the slow climb and sluggish performance of the Firefly in the 1990 tests caused Slingsby Aviation to replace the original 200-horsepower engine with a much larger and heavier power plant, generating 260 horsepower. This solved the power problem, but it created a host of other difficulties. When the new, higher powered Firefly was reevaluated along with the other competitors in the summer of 1991, the problems were apparent. Spins, which were cited as easy to enter and correct a year earlier, were now identified as a problem, especially for a less-experienced pilot. The brakes were even more unsatisfactory than before. Most ominously, the Firefly's new engine had a troubling tendency to just quit, both on the ground and in flight. In seven missions the engine stopped four times, once in the air (during a spin) and three times on the ground. The engine stoppages were attributed to changes made in the fuel system to feed the new engine (Broad Area Review, 1998, 15).

In retrospect, a larger problem is clear. An aircraft is a system in which everything affects everything else. Among the most critical of all those elements is the engine. When Slingsby replaced the original four-cylinder, 200 horse power engine with the much larger six-cylinder 260 horse power motor, changes rippled throughout the entire system. The fuel pump had to be moved and fuel lines repositioned. The exhaust system was moved closer to the fuel filter, causing fuel to overheat and suggesting that the above-mentioned engine stoppages were systemic problems, not mere anomalies. Still worse, the new engine weighed 80 pounds more than the original, pushing the Firefly's critical center of gravity out of balance—even more repositioning and rerouting of other systems were required to get the aircraft's weight distribution back in balance (The making of a trainer, 1998). The brakes, never exactly a strong point, were now insufficient to hold the reengined aircraft in place on the ground (Broad Area Review, 1998, 15).

The deeper problem is equally clear: The engine change, with its ripple effect through the rest of the aircraft, effectively destroyed the integrity of the commercial off-the-shelf acquisition strategy. The whole project approach was undermined: the aircraft being bought was not a commercial product, and there certainly was nothing "off the shelf" about it. In its brief life, the Air Force's Firefly was the subject of wholesale changes, generating 131 service/modification bulletins, an average of about two per month (Broad Area Review, 1998, 67). The reengined Firefly had become—or at least *should* have become—an experimental aircraft.

22.5 MOVING AHEAD

Following the evaluation of all competing aircraft—an assessment that lasted only *twelve days* (Broad Area Review, 1998, 11)—the Air Force issued a Request for Proposal in September 1991. The Slingsby Firefly with the larger engine, by now designated the T-3A, was selected on April 29, 1992, a decision immediately protested by some of the losing bidders. Following a review by the General Accounting Office, the contract award was upheld. The first Firefly was delivered to the Air Force on June 15, 1993 (Broad Area Review, 1998, 12). The total fleet would eventually be 113 aircraft: 56 based at the Air Force Academy in Colorado Springs and the remaining 57 at a flying training squadron at Hondo, Texas (Broad Area Review, 1998, 4, 9–10).

22.6 TESTING

Because the T-3A was at least officially a commercial off-the-shelf (COTS) acquisition, testing was very much abbreviated. In September, 1993—over a period of just eight days—test pilots evaluated the T-3A. Surprisingly, most of the testing was done by the manufacturer's test pilots, with the Air Force in only a supporting role: "Slingsby primarily conducted the test, with participation by the 4950th Test Wing . . . Slingsby's final report stated that the T-3A demonstrated full compliance with system specifications" (Broad Area Review, 1998, 16).

In addition to the dubious value of a contractor's own employees assessing the degree of that contractor's own compliance, there is another troubling point here: those chosen for such work are likely to be highly skilled and experienced test pilots. But the people who would fly the T-3A in its operational role were 20-year-old college juniors supervised by instructor pilots of widely varying backgrounds. This concern was supposed to be addressed in a later phase of testing called Qualification Operational Test and Evaluation (QOT&E).

QOT&E was designed to take the aircraft from the hands of test pilots and into the hands of pilots with more typical qualifications. The goal was to see how the aircraft would behave in its operational environment. QOT&E took place at Hondo, Texas. At an elevation of 930 feet, Hondo was not at all similar to the Air Force Academy, at whose 6,572-foot elevation airfield half of the Fireflies would operate—and where all the fatal crashes would ultimately occur (Broad Area Review, 1998, 30).

QOT&E was to be in two phases. Phase I, scheduled for 14 weeks, was cut to just five weeks because the test aircraft were delivered late. And Phase II had to be cut short as well because of "extended grounding of the fleet due to uncommanded engine stoppages during the test" (Broad

Area Review, 1998, 17). In short, the aircraft were delivered too late to be properly tested, and of those that were delivered, engine stalls were so frequent as to make their testing impossible. In a marvel of bureaucratic "weasel wording," the testing agency rated the T-3A as "operationally effective but not suitable," noting that while the criteria for aircraft availability was 81 percent, the T-3A was fully mission capable only 15.8 percent of the time (Broad Area Review, 1998, 17).

22.7 THE FALL OF THE FIREFLIES

But by now the pipeline was open. The official "acceptance ceremony" for the T-3A took place at Hondo in October 1994, the month *before* the "operationally effective but not suitable" assessment. In January 1995 the first T-3As arrived at the Air Force Academy, and it was the very next month that the first disaster occurred.

On February 22, 1995, an instructor pilot and his student were killed when their T-3A plummeted into a Colorado pasture. Investigators concluded that the young cadet had inadvertently put the Firefly into a spin from which the instructor pilot could not recover. Following the accident, spins—a major justification for the T-3A in the first place—were banned from the flight screening program (The making of a trainer, 1998). Morale in the flight training squadrons dropped as the instructor pilots began to question the validity of the EFSP initiative (Broad Area Review, 1998, 39, 42).

In September 1996, a second T-3 crashed, again in Colorado. The pilots had been practicing simulated forced landings, an especially useful activity given the Firefly's propensity for engine trouble. As in the first crash both pilots died, and simulated forced landings were soon banned as a result (The making of a trainer, 1998).

Just nine months later the third and last fatal accident occurred. While approaching the Air Force Academy's airfield, the Firefly fell into a stall and spin, striking the ground before the crew could recover. Again, both pilots died. A few days later, when another Firefly lost power on landing, the entire fleet was grounded temporarily (The making of a trainer, 1998).

22.8 THE FIREFLY'S LAST DAYS

Following attempts by the Air Force, Slingsby, and others to find the cause of the Firefly's engine stalls, the Air Force hired a contractor to evaluate the problem. While the investigation was never able to isolate a single cause for the failures, it resulted in a list of necessary changes to the fuel system. Ten of those changes were incorporated, tested, and approved by the Federal Aviation Administration (FAA) (USAF Modifying Slingsby Trainers, 1998).

In 1998, the year following the last of the fatal crashes and the grounding of the fleet, the Air Force Flight Test Center was finally tasked to test four Fireflies, both with and without the recommended modifications. At last the Firefly was subjected to the rigorous testing that it should have undergone years before. For 15 months Edwards Air Force Base test pilots flew 417 flights for a total of 604 hours, subjecting the Fireflies to intentional mishandling and even "abusive conditions." Their conclusions were that the Firefly was "safe for training," although they recommended 27 additional changes to the aircraft, flight procedures, and training curricula. Most of the recommendations were related to just two areas: aircraft handling and control, and the fuel system (T-3A System Improvement Program Final Report, undated, 1, 25–27).

Ultimately the tests were again cut short: on October 9, 1999, the Air Force decided to ground the fleet permanently (T-3A System Improvement Program Final Report, undated, 2). Following unsuccessful negotiations to sell the remaining 110 Fireflies back to Slingsby, the Air Force made initial plans to scrap the entire fleet, intending at the time to sell the aircraft for parts (Air Force might sell troubled T-3 Fireflies, 2001, 10).

22.9 LESSONS FOR PROJECT MANAGERS

The costs of the Firefly program were high in terms of dollars and incalculable in the loss of human life. If the project is to be of any value to us now, it can now only be in the lessons it holds for future project managers. Some of those lessons include the following:

22.9.1 Lesson One

Like an aircraft, a project is a total system in which every part affects every other part and in which all parts must fit together. This was never the case with the T-3A. All three accidents, for example, occurred at the Air Force Academy, with no crashes at the contractor-operated flight school at Hondo, Texas. At least two systemic differences existed between the Academy's T-3 operation and its Texas counterpart. First, the Academy airfield was a mile higher, with the thinner air causing a significant drop in the T-3A's performance. Second, the Air Force Academy instructor pilots were experienced in large jet aircraft not small aerobatic planes like the Firefly, nor were most of them full-time instructor pilots: almost half held full-time jobs as academic faculty members, flying only a few hours per week (Broad Area Review, 1998, 40). In contrast, the commercial instructors at Hondo flew full time and on average had *seven times* as much single-engine experience as the Air Force Academy instructors (Broad Area Review, 1998, 38, 41). The testing eventually done by the Air Force Flight Test Center suggests that in the highly skilled hands of expert aerobatic pilots, the quirks of the Firefly were not necessarily fatal ones. But replace those pilots with the less-experienced Academy instructors and the integrity of the T-3A flight screening *system* appears to have been compromised in a deadly manner.

22.9.2 Lesson Two

The commercial off-the-shelf acquisition strategy proved to be inappropriate for the T-3A, given the substantial modifications that the aircraft required. It is true that a well-executed COTS strategy can save time and money by reducing both development and testing effort, but as soon as the Firefly's engine was changed, with all the other resultant modifications to the aircraft, the COTS strategy was no longer feasible.

This lesson is acknowledged in a DoD policy statement issued well after the grounding of the Firefly fleet:

> A commercial off-the-shelf (COTS) item is one that is sold, leased, or licensed to the public; offered by a vendor trying to profit from it: . . . available in multiple, identical copies; *and used without modification of the internals* [emphasis added]. (*Commercial Item Acquisition, 2000, 3*)

Certainly the scores of changes made and/or recommended to the Firefly qualify as substantial "modification of the internals." But other references in the DoD policy statement seem specifically tailored to prevent another Firefly-style failure. For example, when considering COTS items, the DoD acknowledges that in COTS acquisition projects there will probably be variation between what the user/client wants and what is already on the market:

> A gap will exist between DoD and commercial use—and the gap may be large . . . Modifying the commercial items is not the best way to bridge the gap . . . If the gap is too great, commercial items may not be appropriate . . . Don't modify the commercial item. . . . . (*Commercial Item Acquisition, 2000, 7, 8*)

The adage about "not having one's cake and eating it too" applies here: it is unwise and imprudent to think that one can choose a strategy, accept the benefits of that strategy, and then ignore its inherent penalties.

22.9.3 Lesson Three

A project needs to be tested in the environment in which it will actually operate, and with the people who will actually operate it. As obvious as that statement is, it is important to understand that it never happened with the Firefly. The initial testing was largely done by the contractor's own test pilots, and the Air Force Flight Test Center evaluation, performed after the fatal accidents began, was also carried out by highly skilled professional test pilots. Even the brief operational testing that was scheduled at Hondo was cut short by the Firefly's engine problems. And the testing done there was performed by the vastly more experienced commercial instructor pilots, not the full-time professors, part-time pilots prevalent at the Air Force Academy.

22.9.4 Lesson Four

Concurrency kills. Normally, concurrency refers to overlap between project stages: to start testing while designing or to start producing before testing is complete. But in the case of the Firefly, the stages of the project were actually *reversed*: purchase the plane, then change the design, then deliver and operate it, then learn its shortcomings, and only afterward subject it to thorough and rigorous testing.

Concurrency can be, of course, a necessary project tactic, often for competitive reasons: without concurrency the three-year product development cycles common to the auto industry or the much shorter cycles of high-tech firms would be impossible.

In this case, though, one has to wonder: What was the rush? Why was such a high degree of concurrency necessary? This was no wartime emergency, no crisis response. The previous screener aircraft was performing safely, reliably, and—except in the eyes of at least one senior Air Force leader—effectively. If there really was a need to move to an aerobatic airplane, wasn't there time to do the job in a careful, measured manner, with a rigorous source selection and with thorough and operationally representative testing?

22.9.5 Lesson Five

Beware of "mindguards." In his work on the phenomenon of "groupthink," in which group members sacrifice their own independent judgment in order to fit in with the beliefs of their group, the psychologist Irving Janis coined the term *mindguard.* Just as a bodyguard protects a person from physical threat, a mindguard protects decision makers from ideas that threaten their own established mental paradigms.

Certainly the Air Force chief of staff was committed to the Firefly, and he remained unrepentant even after the accidents, even after his own retirement. In 1999 he was still defending his push for the Firefly: "We're trying to produce warrior-pilots, with the emphasis on warrior. We want people who are adventure- and warrior-oriented, and we couldn't test for that in the old plane. Anybody can fly that—it's for grandmothers" (Are air force cadets flying the wrong stuff?, Insight on the News, March 15, 1999).

The record on the Firefly is extensive, and many of the "Monday Morning Quarterback" critics of the Air Force's actions focus on the decisions of the chief of staff. Those critics argue that he unilaterally pushed for an unnecessary, unsound, and unsafe program, and they lay the responsibility for the crashes and the fatalities clearly on his shoulders. Certainly, his widely reported comments about "your grandmother's airplane" and "not training dentists to fly their families to Acapulco" lend credence to his reputation as a glib and insensitive autocrat.

But curiously absent from the extensive record of the Firefly project is any reference to anyone actually *telling* the chief of staff of their concerns, or of anyone challenging his views on the urgency of the program. To one familiar with the military, or indeed familiar with any large hierarchical entity, such an absence of upward-directed criticism is hardly surprising—careers are rarely enhanced by telling the boss he's way off base.

And so is created one more burden for top executives: to ensure that they surround themselves with people who will do their bidding but who at the same time will be honest sounding boards and principled critics of flawed policies. Subordinates rarely assume those critical roles upon their own initiative—rather, they need strong and continued encouragement from the senior executive.

22.10 CONCLUSION

Peter Drucker used to tell his graduate students that when intelligent, moral, and rational people make decisions that appear inexplicable, it can only be because they see a reality different than that seen by others. With that in mind, what reality did the T-3 project managers see?

Jack Meredith and Samuel Mantel, in their book *Project Management,* offer a possible answer when they describe a project model that they call "The Sacred Cow":

> In this case, the project is suggested by a senior and powerful official in the organization. Often the project is initiated with a simple comment such as, "If you have a chance, why don't you look into . . .," and there follows an undeveloped idea for a new product . . . The immediate result is the creation of a "project" to investigate whatever the boss has suggested. (*Meredith and Mantel, 2000, 45*)

What was the fatal flaw in the Firefly tragedy? Was it a lack of consideration for the "systems approach"? A commercial off-the-shelf buy that evolved into a developmental program? Or was it inadequate testing in a true-to-life operational environment? Or perhaps "too much" concurrency? Or was it a rushed favorite project of a willful senior leader who was insufficiently counseled by his subordinates?

The most likely answer is that the Firefly failed as a result of a combination of all these issues. But one thing certain is that the lessons of the Firefly apply to projects of all sorts, in all sorts of organizations. We can choose to learn from those mistakes, or we can choose to ignore them at our peril.

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CHAPTER 23
LESSONS LEARNED ALWAYS HAVE A PRICE TAG

Marty Burke

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On leaving Defense, Marty was vice president of marketing for the project management software products division of a multinational software development and sales corporation prior to accepting his current position. Marty has been a longtime member of the Project Management Institute (PMI), and a senior member and former Canadian president of the International Society of Logistics Engineers, among other organizations.

23.1 INTRODUCTION

One aspect of project management that often seems to suffer neglect, and as a result sometimes leads to disastrous consequences, is transition management. You ask, "Transition what?" (See Figure 23.1)

When we fail to connect the dots, there are consequences. The now infamous 9/11 demonstrated this well and caused us to learn some very painful lessons. Do these failures occur in project management where we sometimes forget to connect the dots? You bet they do! After spending 12 years in key positions on three multibillion dollar projects, running a management school for five years, serving as vice president of an international project management software corporation, and more recently as president of a project management consulting and training corporation for the last six years, I can assure they do.

23.2 DISASTERS IN THE MAKING

Allow me to cite some examples.

The first example that comes to mind is "inadequate logistics support packages." It's called, "Let's buy an extra deliverable; the bean counters can fix it up later." During the life of one deliverable that was put into operation without a proper transition management plan, the support matrix was suddenly faced with catastrophic failures. Four of the same-type project deliverables were in a constant state of cannibalization to keep the remainder of these deliverables operational. At $50 million a deliverable, this meant that four were nonoperational at all times. This was expensive in the extreme and could not be tolerated for long. A high-priority study was commissioned

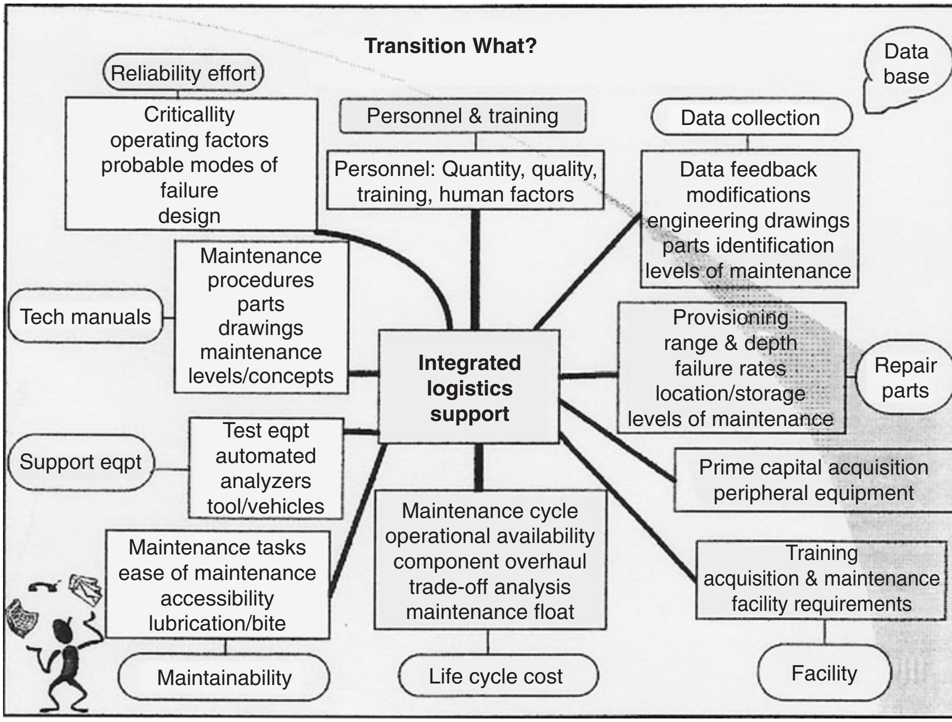

FIGURE 23.1 Transition management.

and after thorough examination, the study team presented 80 recommendations to senior management to redress the situation. These 80 could be distilled into two actions—get more parts and repair the deliverables!

I was placed in charge of what I would term a *second initial provisioning*. This was not an exercise in "topping up" the parts already procured. This was the identification and procurement of parts that were never procured in the first instance nor were they identified by the project to the in-service supporters at handover as deficient. It's probably not coincidental that the cost of the second initial sparing nearly equaled the price of the one additional deliverable that had been procured beyond forecast. I will leave the readers to draw their own conclusions here.

Another illustration that comes to mind is "configuration management gaffs" (i.e., interpreting contractor data handed over to the client at contract closure). What would you think if a prime contractor to your project one day wheeled in a cartload of stacked, printed paper into your office? This was a long-running, somewhat complex project. I was the project's fourth Integrated Logistics Support (ILS) manager. I hadn't read the fine print in the contract written and signed 11 years previously. Essentially, what it said was the contractor would manage the configuration data to contract completion and hand it back to the client at contract's end. Now here it was staring up at me from the cart. The problem was that in the intervening 11 years, the client organization had instituted a computerized configuration management system to replace its original handraulic system. The client also never made the project aware of this innovation. In turn, this information was never relayed to the contractor. Fortunately, the deliverable had only about 400 parts in its configuration. Nonetheless, it took about a week of engineering time to interpret the data and reconcile the data to the correct format for input in the client's configuration system. I shuddered at the thought of what might have transpired if this had happened in one of my previous projects. In one, the deliverable had over 200,000 parts! Would we still be sitting there sorting things out?

Changing maintenance concepts in midstream is a third example. Let's refer to this as "Don't count on your maintenance plans until you own the software for the Automatic Test Equipment (ATE)." Again, this was a complex deliverable that required intensive ATE to fault find and insolate equipment failures. The original maintenance concept called for ATE at first line maintenance to find and yank the nonfunctioning electronic box from the deliverable and send it to a second line facility for repair by "smart" technicians with extensive shop equipment. Only a trickle of repairs would be returned to the Original Equipment Manufacturer (OEM) for repair work that was beyond the capability of the second line facility. However, after a detailed cost study of the software to run the ATE at second line, it was determined that software would cost over ten times the original forecast. Timing is everything, and this study had been delayed while procurement, based on the original maintenance concept, went forward. The prohibitive cost of the ATE software forced the work scheduled to be performed at second line to now be conducted primarily at the third line OEM facility. Since this was not discovered until a third of the initial spares procurement was already contracted, based on the originally forecasted heavy repairs that were to be conducted at second line, it became even more expensive. The training, sparing, and physical length of the repair pipeline was now stretched to the limit. Additional time and resources were required to ultimately address this situation with corrective action. This could have been prevented if these critical, unknown costs had been accurately predicted at the project's inception.

This last example I will share is "absent or runaway configuration control." This might more commonly be called "suiting up the combatant," or "Herbie the foot soldier goes to war, but nothing fits, functions, or fires." When the deliverables from several independent projects were brought together, it became immediately evident that the right hand had absolutely no idea of what the left hand had been doing.

To this point in my career, I had always dealt with air environment projects. I pointed out to my current land environment colleagues that aircrew become particularly twitchy if you hang new things from their aircraft that may change their center of gravity. In fact, they insist on having a configuration control board for their aircraft. This board is the only authority to approve any and all changes or modifications to the craft. I proposed that, if, in their environment, the foot soldier was considered as a primary weapon system, then such a board would also make the same sense. Without it, in essence, Herbie might well be struggling onto the battlefield with more gear on his back than would allow him to stand upright! A configuration control board was instituted for Herbie, and now the deliverables from all projects must be approved by this board prior to adding it to his gear and load.

As the old adage goes, "Sometimes the dragon wins!"

23.3 PROCESS AND RIGOR

So how do we prevent these catastrophic situations from developing and causing parts of, or our entire project, from crashing and burning? Well, I was certainly casting around for the answer to this question. The project on which I was working had three major deliverables, and the first of them was now ready to be moved to the in-service support matrix while the project completed the remaining two deliverables. This triggered my question to our project support office that was the keeper of methodologies and best practices. After requesting a copy of their template to effectively transition my deliverable, there was a moment of silence at the other end of the phone. Finally, the project support person came back and acknowledged they did not have such a template, but that if I were to develop a successful one, they would certainly like a copy for future projects. As they say, "Necessity is the mother of invention," and the rest is history.

23.4 DEFINING THE METHODOLOGY

Having an Effective Transition Management (ETM) plan in place will go along way in helping to ensure a smooth operation by the intended client of the project's end deliverable/product. We can define this as a process by which a capital acquisition, or an in-house-made product, is moved successfully from a project to the in-service client support matrix. During this transition, no pieces of the project are allowed to drop down the "crack" between the two organizations.

One of the objectives of this chapter is to gain an appreciation of what effective transition management is about, its potential impact, and its uses as a template. This process makes no room for ambiguity, allows no hidden meanings, and will not tolerate any double talk.

Using a transition management process is both generic (vanilla or transparent) and is proven in real-life projects that have already shown their success. This process provides both a vehicle to do long-range planning and a methodology to develop a process map and procedures to implement the process.

So what do we mean when we use the term *transition management?* In straightforward language, it's our ability to effectively move operations management responsibilities from the project to the support matrix for the in-service phase of the deliverable/product(s) life cycle. In other words, we are striving to provide a smooth and unbroken surface between the project and the support matrix—a surface where no gaps occur in which pieces of the Work Breakdown Structure (WBS) of the project may disappear while the project and client participants are saying, "Wasn't that your assignment?"

I have alluded to some life cycle connections. Firstly, we should be thinking of a product's life as having distinct phases, commonly considered to be concept, design, acquisition (buy or build), transition, in-service, and finally, disposal. Although projects traditionally do fairly well with the first three phases, they often fall down at the transition phase and leave the support matrix reeling in its initial efforts to maintain the product in operations. Fortunately, there is an available methodology to prevent this catastrophic situation from developing. It's called Effective Transition Management (ETM).

ETM is a two-pronged process consisting of a governance structure and a computerized tracking system. And just how is this supposed to help, you ask? Think of it as a way to prevent *any* work packages in the WBS from being unattended or left behind. And where may this system be used? It's applicable to all capital acquisition projects, whether they're private sector commercial ventures, government projects for domestic programs, foreign military sales, grant aid and other assistance programs or academic programs, portfolios, and projects.

Recall that effective transition management is a generic methodology. It can be used for anything—from building a bicycle to constructing a complex fighter aircraft. When initiated at the front end of a project, it serves as a project management tracking tool. If started at the initiation of the deliverable deployment phase, it becomes a pure transition management tool.

The effective transition management methodology has passed the acid test, the beta test, and a baptism of fire under real-time adverse conditions. Its proven methodology has been used within the Canadian Defense Department for over a decade. Some of the programs where it's been employed, completely or in part, were the F/A-18 Fighter Aircraft Program, Small Arms Replacement Project, Navy Tribal Class Update and Modernization Program, Naval Patrol Frigate Program, Maritime Coastal Defense Vessel Project, and the Military Operational and Support Trucks Program, to mention a few. The total value of these programs and projects exceeds $30 billion to put the use of this methodology in context.

23.5 BENEFITS

What then is the benefit to using such a methodology? Essentially, it's to ensure immediate and smooth operations support management. It's a forward pass from the project to this support matrix. Ultimately, in this managed handover no pieces are allowed to be unaccounted for or left unattended. This ensures functional operation of the product as intended, without time and resource consuming glitches.

Conceptually, I mentioned that this process is a twofold methodology. It's a long-range planning tool that uses a WBS as its start point and, in turn, it helps develop the process map and procedures for the transition of each Work Package within the WBS.

23.6 STRUCTURING THE RESPONSIBILITY MATRIX

In preparation for an ETM process, enough emphasis cannot be placed on getting an early start, getting a green light from top management for use of an ETM process, and customizing this ETM process to be used within the project. The methodology will need to be tailored to meet the project requirements and staffed appropriately.

We've also touched quickly on a term known as a *governance structure.* Ohio State University, for one, defines governance as the planning, influencing, and conducting of the policy and affairs of an organization (in our case, the organization refers to a project). It is also referred to as the responsibility matrix. The governance structure is broken into components such as a senior management board, sponsor, steering committee, project manager, working groups, and subcommittees. The key success factors that must be observed are delegation and accountability.

A senior management board normally is the source of final approvals where the top level project decisions are made, and it acts as the last line of final arbitration. By contrast, the project sponsor normally identifies the capability deficiency to be addressed and provides the resources (usually funding) to redress this deficiency.

Within this governance structure, the project manager normally has cognizance for resources and expertise to carry out all transition responsibilities. It is also the project manager's responsibility to ensure there is no degradation in the conduct of operations resulting from this deliverable transition.

In completing this governance structure, we must also situate the steering committee and working groups. Think of the former as planners and the latter as implementers. The steering committee is normally formed early, has a chairperson or cochairs, who are nominally the program/portfolio manager, project manager, and/or the lead support manager. There is normally a secretary to the chair, and the committee members usually consist of managers from the lead support matrix. The working group, which is formed next, also has a chair, normally the project integrated logistics support manager, and a deputy that is the designated transition manager from within the project. This group will include regular members and ad hoc members as required. The working group is subordinate to the steering committee.

23.7 TESTING FUNCTIONALITY

One purpose of the steering committee is the reaffirmation of the organization's commitment to the project's transition plan for its deliverables. It is also responsible to resolve differences in expectations, and it determines and prioritizes tradeoffs between scope and scale, schedule, and resources within the ETM. In contrast, the working group develops the detailed transition plan and executes the transition activities.

It's important to note here that subcommittees of the working group are formed as required, and member representation is normally by their subject matter expertise of the issue or issues under consideration. Subcommittees and their membership will change from time to time as issues evolve or are resolved.

The transition manager may be selected from the project, the matrix support organization, or co-chaired by both. It's the transition manager's responsibility to initiate the transition plan, and in the end, to bring the transition of deliverables and their intended support to a successful conclusion.

23.8 CONTRACTUAL AGREEMENTS

To ensure that all Work Packages assigned from the WBS are accounted for, a manager's Work Package Assignment contract is initiated. This contract normally includes a work package number, transition start and end dates, Office of Primary Interest (OPI), Office of Collateral Interest (OCI),

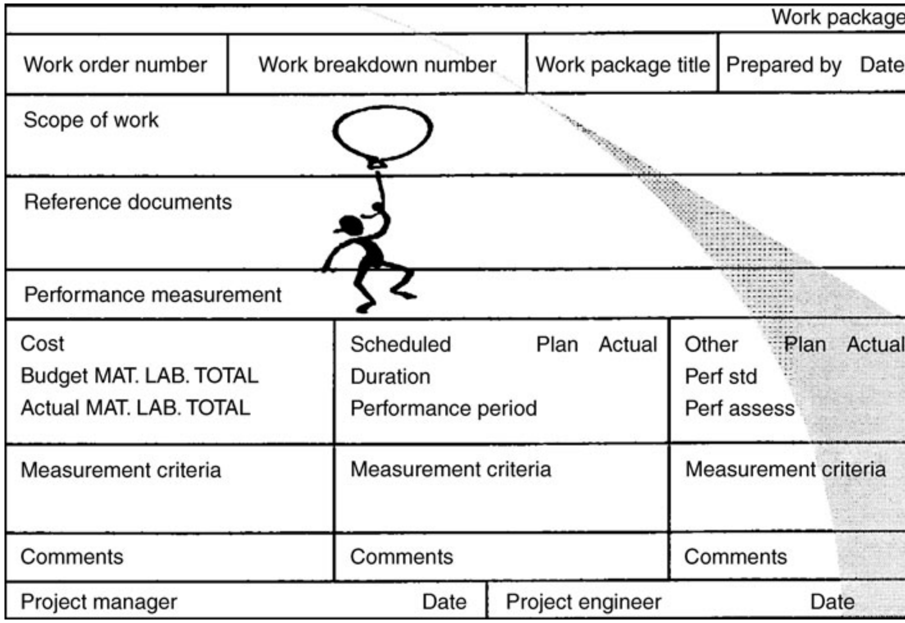

FIGURE 23.2 A sample work package assignment contract.

performance measurement criteria, and an area to report percentage of the package completed and remarks as required. It should be noted that all changes to start/end dates for the transition of the intended Work Package must be approved by the Transition Manager and a written record of amendments kept. This sample is typical of these contracts but may be modified to suit the needs of individual projects (see Figure 23.2).

23.8 DATA FLOW ROAD MAP

The Transition Plan Data Flow will normally be set up as expressed in the following chart and will be modified as require by the project (see Figure 23.3).

23.9 PROGRESS MEASUREMENTS

The progress review chart of the transition may then be portrayed from the transition database repository at any point in time. This chart allows to be seen at a glance, the percentage of completion and incompletion of total transition activities, their owners, and it has the ability to drill down to specific details of the incomplete activities (see Figure 23.4).

23.10 THE HAND-OFF

The completed transition is formalized by a handover certificate signed by the Project Manager and the Lead Matrix Support Manager. This document is the official handover of the deliverable or deliverables from the project to the in-service support staff. It may be completed incrementally if

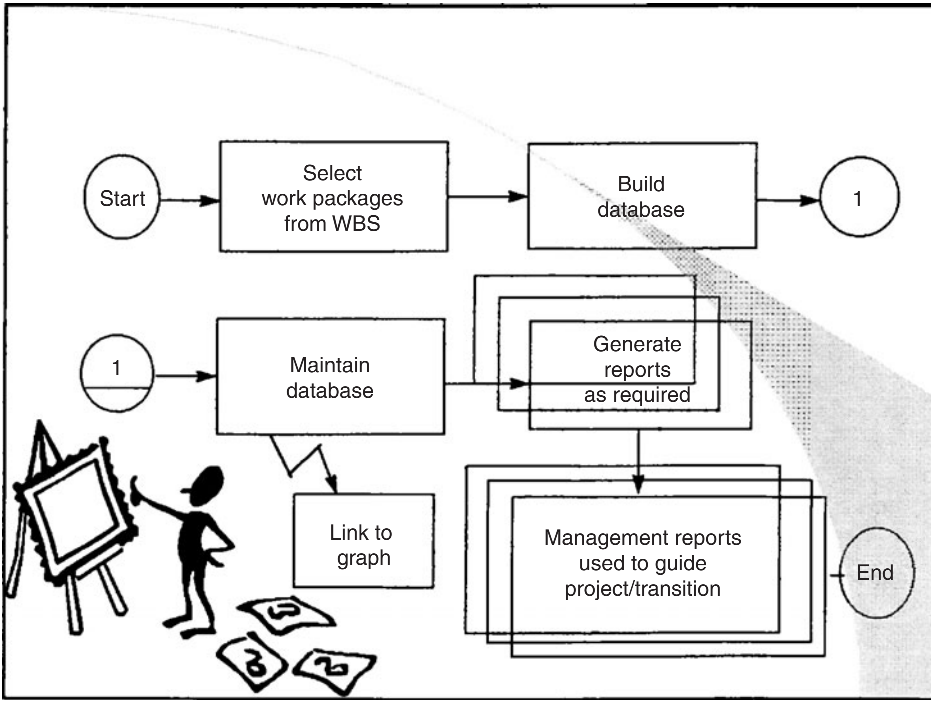

FIGURE 23.3 The transition plan data flow.

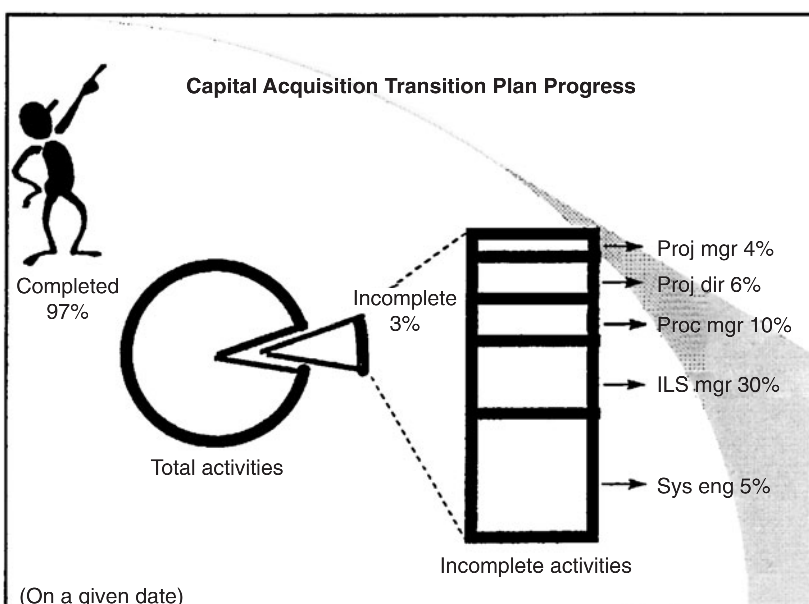

FIGURE 23.4 A sample progress review chart.

there are multiple deliverables, and the transition is intended to be made one deliverable at a time. Alternatively, any and all deliverables may be transitioned at one time as circumstances dictate. Its significance in preventing any Work Packages from slipping between the boundaries that exist between the two organizations cannot be overstated. The handover certificate also contains an exception report by Work Package with its current status if not fully completed at handover. The exception report is critical in preventing a finger pointing exercise down the road where the concerned parties are saying to each other, "Wasn't that your assignment?"

23.11 SUMMING UP

In summary then, effective transition management introduces and uses a hierarchical decision-making model and a database that allows accurate and instant tracking and up-to-the-minute status reporting. In turn, this allows successful integration of any capital acquisition or builds deliverable into the support base of the enterprise. The flexibility and power of this model means that its application is virtually unlimited! Subsequent to the ETM methodology successfully proving its worth, I was asked to present a paper on this subject to a NASA Space Logistics Symposium held at the Johnson Space Center in Houston. Copies of this paper are still available on the Internet from: http://www.aiaa.org/content.cfm?pageid=406&gTable=mtgpaper&gID=83264

23.12 RECOGNIZE AND MANAGE THE RISKS

I mentioned previously that sometimes the dragon wins. One area that can cause you to fall victim to is in the risk arena. A few years ago there was a project chartered to buy a new fleet of dual-role aircraft. It started with a prudent "fly before you buy" type of study that, not surprisingly, lasted several years. Rolling up these scarce skilled salary and travel costs during this timeframe translated into substantial dollars. Following the preliminary selection process that lasted nearly a decade, a project was formed to procure a fleet of the winning dual-role aircraft type. The contract to purchase was signed and production was begun.

The federal opposition party had earlier vowed that if next elected they would cancel this procurement in favor of something less costly. An election was held, and this political party won and formed the next government. True to their word, they canceled this contract as too costly and unnecessary. Subsequently, there were a number of crashes of the aircraft that was supposed to be replaced. This new government reluctantly acknowledged the need to find new aircraft to perform these two roles. However, as it would have been too embarrassing for them to go back to the original manufacturer, a new scheme was devised. The plan was now to buy two fleets of aircraft—one for each role.

Let me say, as a master of understatement, that this was an expensive proposition. Firstly, there was a decade's worth of original evaluation team's salaries and expenses from the original aircraft. Additionally, the new government had incurred nearly a half a billion dollars in cancellation charges for defaulting on the original contract. Now, their face-saving choice of two fleets was more expensive to procure than the original one fleet. It goes without saying that the cost to support two new separate fleets of aircraft was raised exponentially.

Going back to my comment on risk—do you think that the original selection team or the first fleet's project manager had any inkling of how much they would be blindsided by this election? This would not likely have been seen as a realistic risk at that time. What about the voters? Could they have anticipated how costly this election and its results would be relative to the spending of their tax dollars? Not likely.

23.13 RISK HAS THREE DIMENSIONS

The use of a risk management plan and identifying potential risks using a risk-ranking matrix is imperative to good project management. Traditionally, measurement of risk has been based on probability and impact. Those impacted by events like those just described have now added a third dimension to their risk ranking matrix: It's called *precision.* In other words, how well do we understand the potential risk right now? Like probability and impact, precision is also assigned a numerical score based on expertise and experience. Project and Risk Managers revisit this type of risk frequently to determine if the yardsticks have moved and to see if there's a way to either abate the threat or to mitigate it out of existence.

23.14 VITAL INFORMATION

The overall topic of this chapter is lessons learned. This also, of course, includes best practices. As we reach the closure stage of our project, one of the things we are normally required to do is craft a closeout report, or as some term it, a postmortem. In this report we attempt to capture all those events that seriously impacted our project for good or ill. This document, in the end, becomes our report card for senior management to review and our legacy from this project to future projects.

Regrettably, what tends to happen with our wonderful closeout reports? Often, after final and cursory review by our seniors, the document is closed with a loud clap and filed somewhere by the board secretary in the depths of a corporate archive never to surface again! This is most likely not done with malice aforethought; most organizations probably do not have a scheme in place to make efficient use of this critical information. After all, why should we be prevented from going down the same paths next time and perhaps making the same types of costly mistakes? I'm being a bit facetious here, but there is also an element of truth in this question. So what is it that we could, or possibly should, be doing with these accumulated final reports? How do we maximize the value of this important information?

With the availability of database software today and technical resources to assist us in setting it up, one answer is to create a Lessons Learned and Best Practices database that is open to all future projects. Its content should certainly include the project type, its scope, what was actually accomplished within its parameters, and any lessons (good or bad) that were learned, along with any best practices developed. For instance, you should know when estimating duration for procurement that if the item(s) you wish to procure requires you to obtain bids under the North American Free Trade Agreement (NAFTA) because of the item's dollar value, then you should ensure you build in the requisite time established by this agreement to allow bidders in the United States, Canada, and Mexico to submit their bids. This sounds straightforward enough, but if it is an unknown factor, it can cause undue delay to the progress of both the project and transition of the deliverable to the client. A key word search in such a database to glean out this kernel of information could save a project untold grief and its need for use of emergency contingency plans.

23.15 RECOMMENDATIONS

In building a Lessons Learned database one needs to be sensitive to the specific details of what took place in the life of the project. This means that what is important here is to capture the relevant facts in a transparent way. This is not an exercise in blame or finding scapegoats for what may have gone wrong in a project. Events for input to this database need to be described so that they are transparent and the message is clear on how to gain from the previous experience of others. Things like the name of the project, particular individuals' names, or other specific information that might assign blame should not be used. Hard-working, honest individuals will certainly resist any finger-pointing. The object here is to benefit by learning from the experiences in previous projects. Projects and events can be described in ways that make them nonspecific and identifiable without castigating them.

Going back to the example used earlier, a key word search for such things as NAFTA or procurement delay, and so forth, will allow you to key in on the dilemma and its solution without identifying the specific project.

Short of creating a database for lessons learned and best practices, these reports should be housed in a central, accessible repository or library. It's one of few alternatives to ensure the value of their accumulated project experiences will ever benefit the organization. An example of additional uses of this documentation might be the identification of a recurring problem surfacing across numerous projects. This may well prompt research for developing an innovative new workaround or process that could itself become a best practice.

23.16 SUCCESS IS WHAT YOU MAKE IT

In short, it's vital to track the life of the project as it progresses through its various phases. We need to closely record and monitor activities as the deliverable moves to the support matrix. To the extent possible, we must identify potential risks, assess their probability, impact, and precision (how well we understand the risk at this very moment), and provide good risk contingencies. Lastly, careful documentation of our lessons and practices will help to ensure both the success of the project, the product, and the organization.

CHAPTER 24
CHINA'S SHENZHOU SPACESHIP PROJECT

Xue Yan

Qian Fupei

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Professor Qian Fupei is the main founder of PMRC, China, and has served as the executive vice president of PMRC for 15 years. He is the vice president of IPMA for research and a member of the International Editorial Board of the *International Journal of Project Management*. He was the Chair of UNESCO/ United Nations Educational Scientific and Cultural Organization/University (UNISPAR) industry Science Partnership, which enhanced the cooperation of University-Industry-Science Partnership in China. He is also the chief editor of National Competence Baseline and China-PMBOK (Project Management Body of Knowledge), and he is the chair editor of the committee of Chinese University Project Management textbooks (14 books); he has published about 30 papers in the project management area.

24.1 INTRODUCTION

Shenzhou-6 manned spaceship was launched at 9 A.M. on Oct 12th in 2005 and landed safely after orbiting the earth for 115 hours and 33 minutes. The mission was sending more than one person into space and orbiting for more than one day. Shenzhou means "the Divine Land" in Chinese, which is an alias of China. Based on advanced technologies and modern project management methodology, SZ-6 project, mainly developed by Chinese Academy of Space Technology (CAST), was very successful. Shenzou 6-Manned Spaceship project has won the Award Winner in the IPMA International Mega Project Excellence Award 2006.

CAST is a primary research center and spacecraft development base. It has twelve research institutes and one factory and has set up a complete and coordinated development and production system comprising spacecraft system design, subsystems development and production, AIT, environmental test, ground equipment and its application, and service and support. To date the academy has successfully developed and launched more than 70 satellites of various kinds and 6 Shenzhou spaceships, including scientific and technological test satellites, communications and broadcasting satellites, meteorological satellites, returnable remote sensing satellites and ocean satellites.

24.1.1 The Background

In January 1992 the Chinese government officially initiated and approved the manned spaceship project. The objectives of this program were to make a historic breakthrough in manned spaceship development in China, to realize multi-people in a spaceship for multidays, and to conduct a series of space experiments in the early part of the twenty-first century. The program was called *Shenzhou* and was divided into six steps known as *Project Shenzhou:* Project one was to test the spaceship; Shenzhou Projects two, three, and four were developing unmanned spaceships; Project five was the manned spaceship to realize one person in a spaceship one day, and Project six was to achieve multi-people for multidays in a manned spaceship.

The whole program was composed by seven main systems: the *taikonauts* (i.e., astronauts) system, the manned spaceship system, the launch vehicle system, the launch site system, the spaceship application system, the monitoring controlling and communication system, and the landing site system. China Academy of Space Technology (CAST) was the primary contractor to undertake the manned spaceship system project, which is the core of the manned spaceship program.

24.1.2 The Missions of the Project

Figure 24.1 is an illustration of the main milestones that made up the manned spaceship's program series of six projects.

The missions of the manned spaceship series projects were as follows:

- To break through key technologies of manned spaceships
- To establish a manned spaceship development and manufacturing system
- To set up a series of manned spaceship standards
- To foster a highly qualified project team
- To establish advanced infrastructure for spacecraft development

24.1.3 Main Project Characteristics

The manned spaceship project had the following challenging characteristics:

- First development of a spaceship in China with less experience
- Advanced technology with many critical problems to be solved
- Complicated system, large-scale cooperation
- Concurrence of infrastructure construction and spacecraft development
- New project team

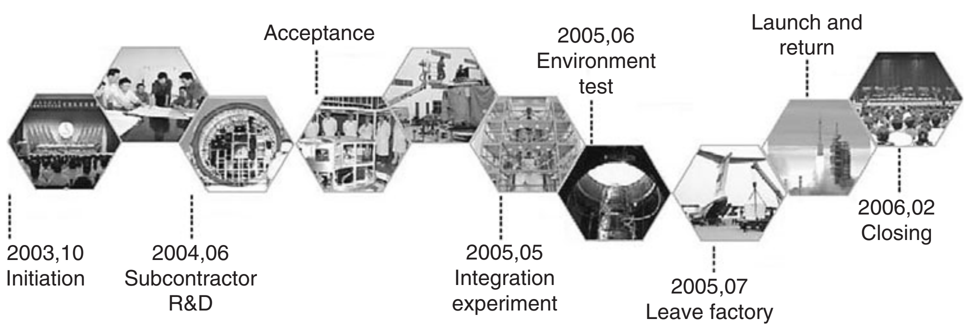

FIGURE 24.1 The important milestones of the SZ-6 project.

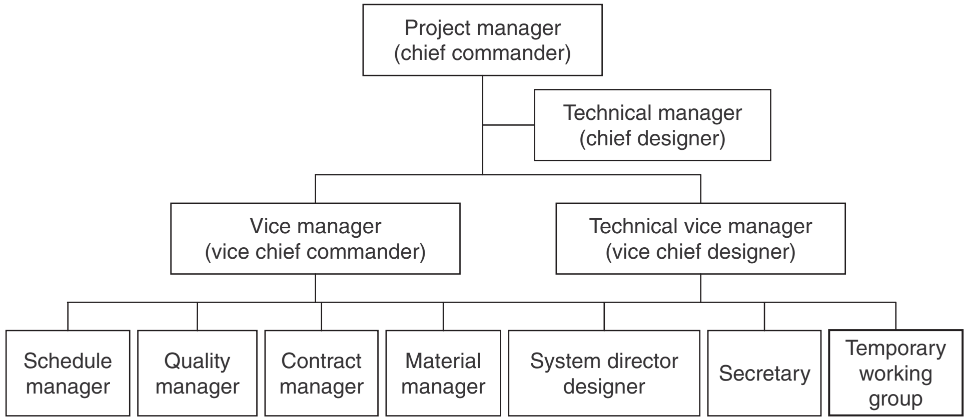

FIGURE 24.2 Project organization structure.

24.2 PROJECT MANAGEMENT ORGANIZATION STRUCTURE

The project management organization structure is shown in Figure 24.2.

The project manager and the project technical manager generally managed the whole project. The two project vice managers and three project technical vice managers were responsible for a specific mission.

24.3 PROJECT MANAGEMENT SYSTEM AND ELEMENTS

Based on the characteristics of the Shenzhou spaceship project, 11 elements were composed as the project management system: configuration management, schedule management, quality management, cost management, human resources (HR) management, material assurance management, software engineering management, information communication management, risk management, reliability and security management, and integration management. The elements were integrated according to the phases of the project (see Figure 24.3).

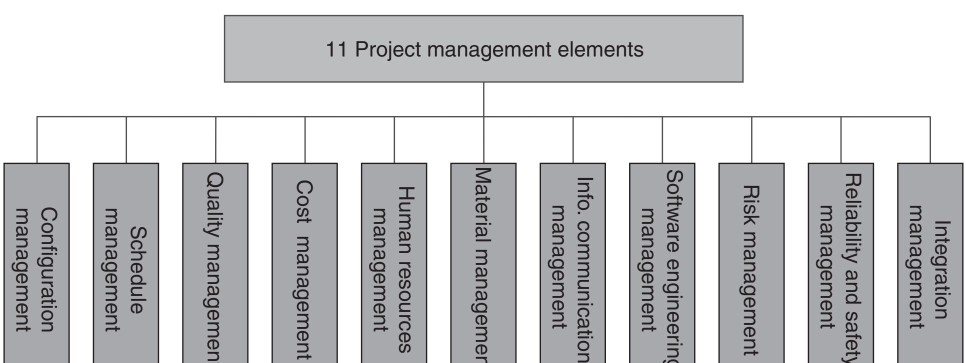

FIGURE 24.3 Shenzhou project management system and elements.

24.3.1 Configuration Management

Configuration management is the basis and starting point of the Shenzhou spaceship project management. Also, since the project function and performance need to be improved continuously, the dynamic configuration management becomes the key to fulfilling the project's goals. Following are the main points of configuration management for the Shenzhou spaceship project:

- Define and set up configuration baselines for each phase.
- Meticulously control configuration changes: five standards (full study and discussion, complete review and approval, acceptance by all stakeholders, test and demonstration, implementation).
- Conduct examination and verification for configuration of various links through form management.

Figure 24.4 illustrates the project configuration change process.

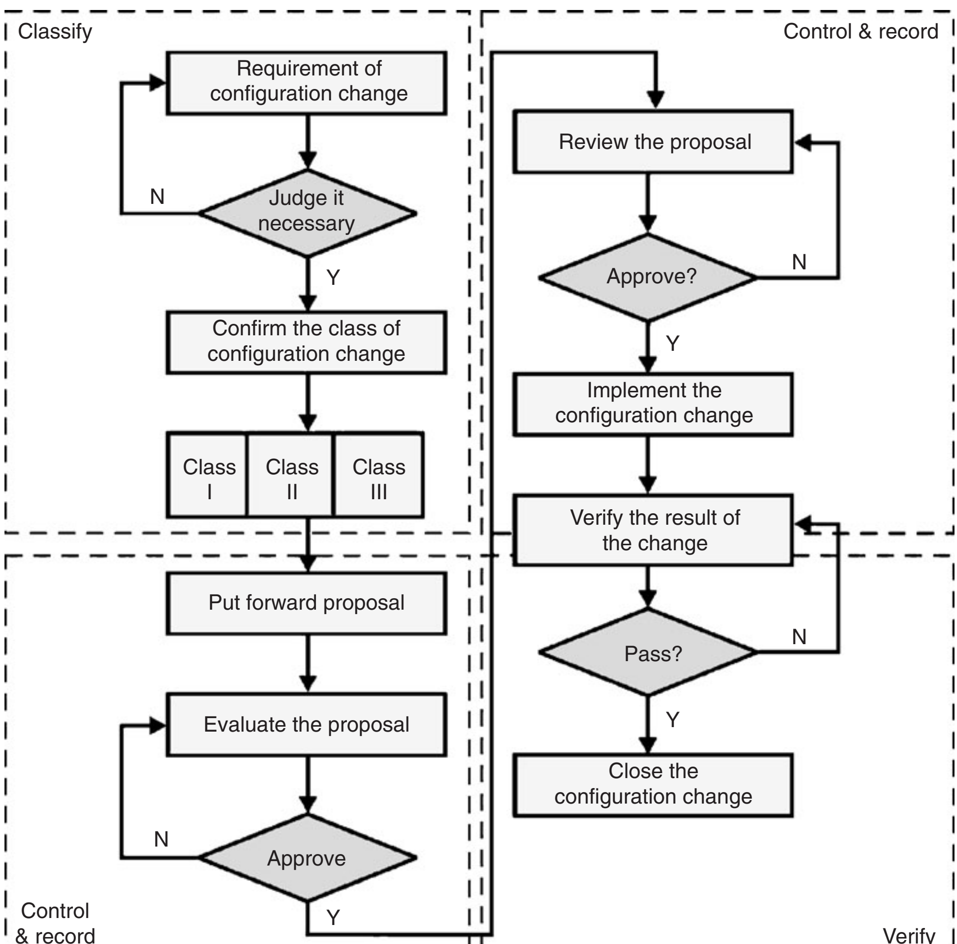

FIGURE 24.4 Configuration change process.

24.3.2 Schedule Management

The Schedule management involved a series of managerial processes and activities to ensure the project could be completed on schedule. Following are the main points for the Shenzhou spaceship project:

- Make plans of various levels, including activities, logical relationships, start time and closure time, assumptions and conditions, etc.
- Intensify and control critical paths.
- Standardize the information reporting system and progress meetings, evaluate deviation of schedule, establish and implement deviation correction measures.

24.3.3 Quality Management

Quality management is the key issue to assure project meets desired requirements It consists of quality planning, quality assurance, quality control, quality improvements, and other processes. The main points of quality management for the Shenzhou spaceship project are the following:

- Preventing quality problems
- Identifying problems
- Correcting nonconformance
- Improving continuously

Figure 24.5 illustrates the process of return-to-zero on quality problems of the Shenzhou spaceship project.

24.3.4 Risk Management

Risk management was very important to the Shenzhou spaceship project—where the uncertainties were very high. Following are the main points of the risk management plan:

- A risk analysis matrix is used to identify, analyze, and respond to possible risks.
- Risk identification and management is an effort that should be continued throughout the project life cycle.
- A risk alert system is helpful in monitoring the risk status.
- A detailed failure disposal plan is needed.

24.3.5 Cost Management

Cost management covers the entire process and all aspects of the project. It is divided into six subprocesses: resources planning preparation, cost estimation, cost budgeting, cost controlling, cost finalization, and cost auditing. These are the main points of cost management for the Shenzhou project:

- The considerations between the economic and technical aspects
- Integration between management of cost and schedule—earned value management
- Cost Evaluation in each phase

24.3.6 Human Resources Management

Human Resources (HR) management refers to a managerial process in which project parties plan, obtain, develop, and scientifically assign human resources to improve work efficiency, realize the

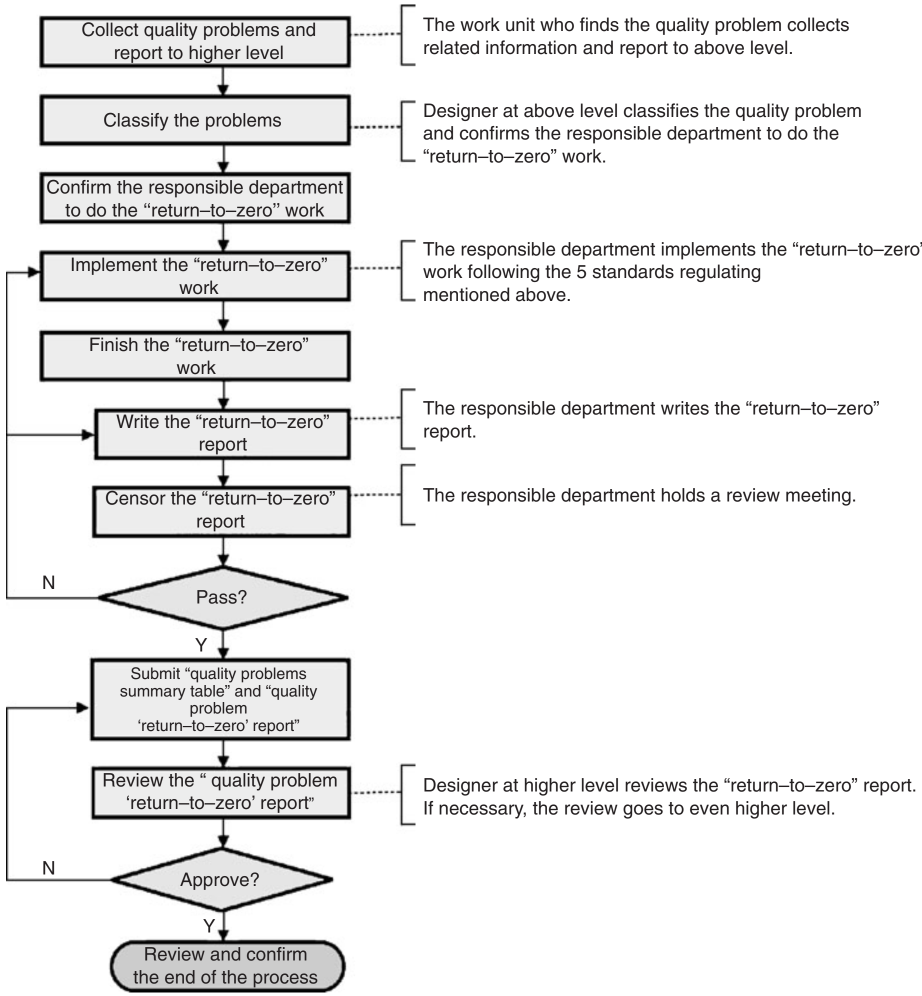

FIGURE 24.5 The process of return-to-zero on quality problems.

optimal allocation of human resources to tasks, mobilize their enthusiasm, and complete assigned work with high quality.

HR management of the spaceship project included the following activities: analyzing human resources demands; working out a management plan; appointing a project manager; establishing a project office; selecting, adjusting, and deploying project members; raising the moral awareness of the profession; developing project teams and temporary teams; and assessing, motivating, and evaluating project members. The following areas were especially important:

- Qualification and certification for personnel selection and employment was determined.
- The experienced technicians acted as mentors for the freshmen, and job position training helped to foster and develop the team.
- A performance-based personal assessment system and harmonious and exciting working environment was created to motivate the team.

24.3.7 Material Assurance Management

Material assurance management refers to the procurement, supply, storage, issuance, and quality monitor of materials. It includes several major processes, such as preparation of procurement plan, preparation of inquiry plan, inquiry, selection of contractors, contract administration, and contract close-out.

Material assurance management of Shenzhou spaceship project included the preparation of a project material assurance plan, the examination and confirmation of the qualified suppliers, and the whole process contract management. The following areas were especially important in preparation for material assurance management:

- Unified process and methods were established in selection, purchase, supervision, verification, and failure recheck analysis.
- The standard was set for raw materials, components, and products.
- Extraordinary control including the element outside of the original catalog, quality issues and time overrun situations.
- A material management database was used.

24.3.8 Information Communication Management

Communication management refers to finding and meeting information demands of stakeholders. Communication management of the Shenzhou spaceship project included the following activities: analyzing the information demands of related parties; establishing a detailed communication management plan relating to the schedule, technology, and quality requirements and objectives; and implementing and updating the plan. The information system, the process, the skills, and the positive and active communication attitude make the difference of the effective and efficient information communication management.

The follows are the main practices in the information communication management:

- Detailed information requirement analysis—the project stakeholders requirements relating to the communication contents, the frequencies, and the means of the communications.
- Effective weekly meetings, monthly newsletters, periodic and annual progress reports, and topic reports.
- Documentation and lessons learned through the project process and close out.
- Information system which including the intranet information exchange platform, OA system, video conference system, quality management information system, cost management information system, material management system, the comprehensive scientific information management system.
- The unique standard system of a manned spaceship was used to standardize the activities of all development units.

24.3.9 Software Engineering Management

Software engineering management refers to defining, standardizing, managing, and controlling activities throughout the software development process. This brings all procedures, all activities related to project development and manufacture, under systematic control, according to the particularities of software product and experiences of engineering management, with the purpose of assuring the schedule and quality of software development, enhancing the maintainability of software, reducing development cost, and improving the success rate and production efficiency of software development.

The follows are the main contents and the key issues for the project Software Engineering Management

- Process configuration management
- Results review and evaluation by the third party—establishing the software assurance center

- Capability Maturity Model (CMM) certification required for critical software developers
- Software standardization and reuse
- Documentation management

24.3.10 Reliability and Security Management

Reliability and security management refers to a series of standardizing, organizing, planning, coordinating, and supervising activities to ensure the reliability and security of products meeting requirements. The key target of reliability and security management is to guarantee the implementation of reliability and security designs and related measures and the fulfillment of anticipated goals by verification through testing and implementation of effective measures.

Reliability and security management of the Shenzhou spaceship project included the following activities: analyzing and separating reliability and security indicators; establishing an assurance outline for reliability and security; conducting security design and analysis; establishing a reliability and security management organization and information management; verifying product design and system design by reliability testing, and determining whether or not the reliability indicators are met; providing important evidences to prove the reliability of the product through complete failure mode and effect analysis (see Figure 24.6).

24.3.11 Integration Management

Integration management refers to a comprehensive managerial activity which coordinates and integrates all managerial activities on project schedule, cost, quality, scope, procurements, and others from a big picture view to maximize the overall results of a project. Integration management of the Shenzhou spaceship project included the following activities: establishing an integration management organization and management system, working out project management plans, and real-time monitoring of the project's overall operation, solving conflicts and problems timely, and integrating change control.

The follows are key issues for the project integration management:

- Lifetime integration management plan for all elements
- Plan covers all activities and relationships of each management element
- The project office is responsible for unified management of the elements
- Integrated analysis and control for changes conducted

24.4 PROJECT MANAGEMENT PROCESSES

Figure 24.7 outlines the five steps in the project management process.

24.4.1 Objective Determination and Breakdown

The first goal in the project management process is to determine the general objectives of the whole project and the annual deliverables and then to break down the objectives to various levels and phases. Figure 24.7 shows the levels of the process.

24.4.2 System Planning

Based on the prject objectives, and the divided annual objectives and stage objectives, the project master plan and the detailed plan were made.

The system planning process is shown in Figure 24.8.

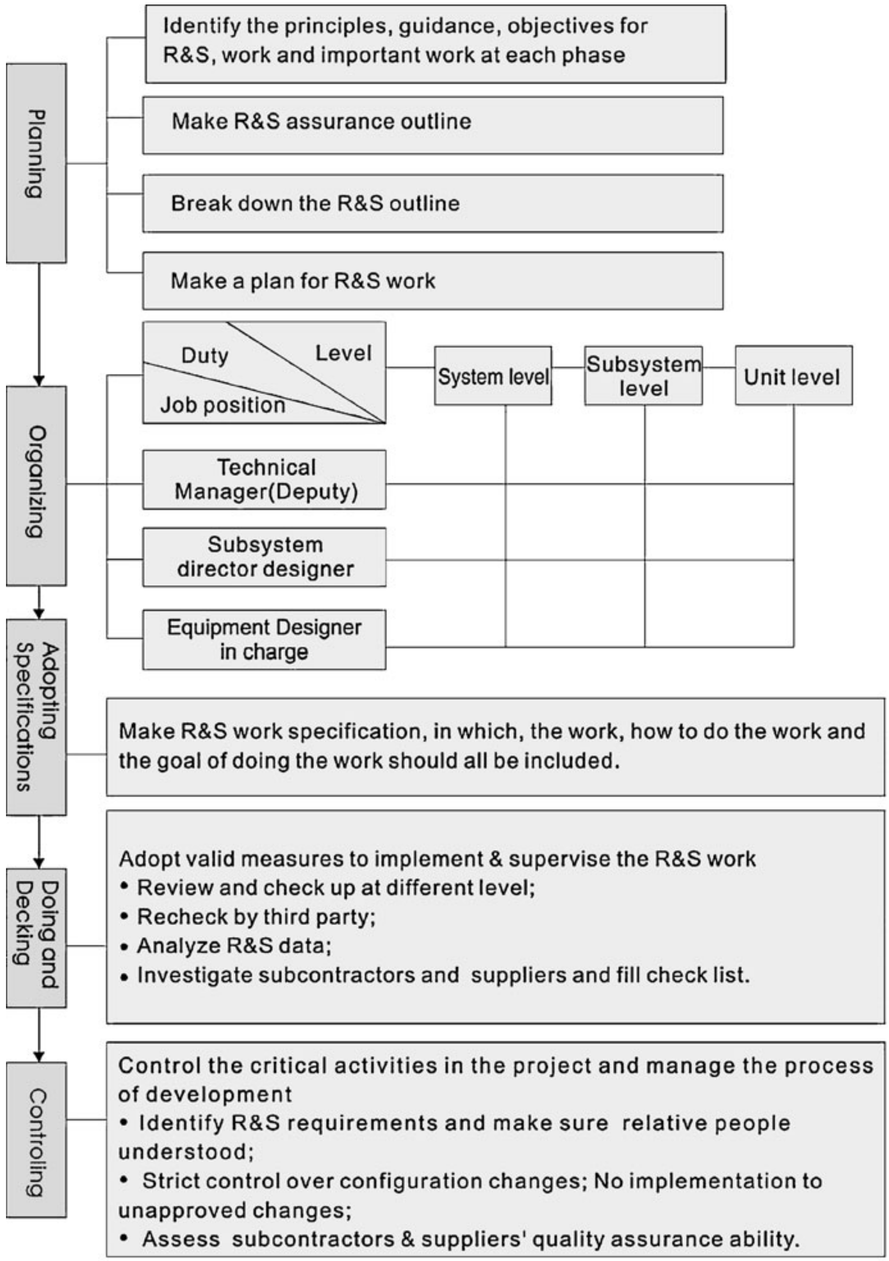

FIGURE 24.6 The reliability and security management process.

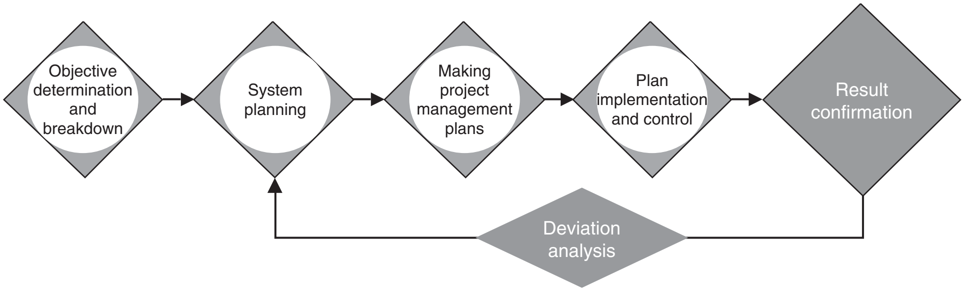

FIGURE 24.7 Project management process.

24.4.3 Making a Project Management Plan

First, the project management plans were conducted according to the planning layout and then opinions were gathered from various units to improve the plans. Based on the system plan and the subsystem management plans, key equipment plans and special item plans were established. An additional plan was used to manage the critical paths activities.

24.4.4 Implementation and Control

According to all levels of project management plans, their implementation flows are worked out, including schedule, quality, material management, and other contents. Methods and means, specified in project management plans, are used to implement and control the plans.

Progress information will be collected from all levels and will be analyzed according to the communication plan. In the event that the finished plan project deviates from its plan flow, it is necessary to discover the underlying reasons and the deviation's affect on the completion of the plan objectives. Measures to be taken in the following plan projects must be established to guarantee the successful completion of plans through rectifying deviations by exploring potentials. Detailed plans, distribution, checking, and examination are very important for the success of the project management plan.

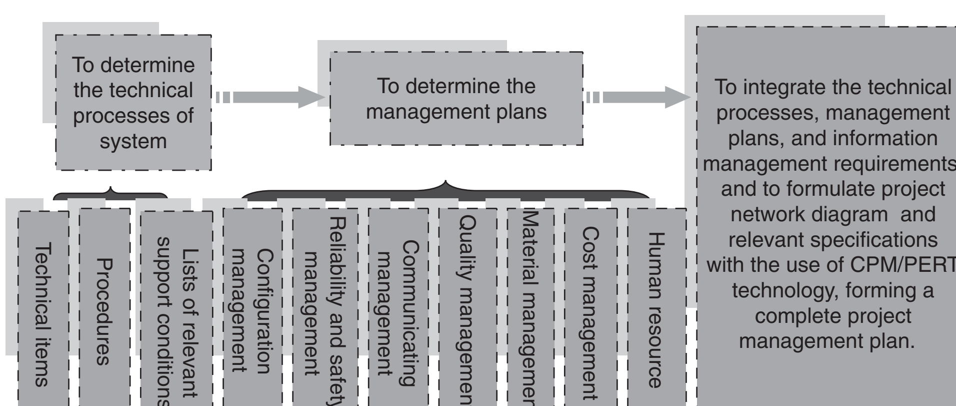

FIGURE 24.8 System planning process.

24.4.5 Result Confirmation

In each phase and milestone, the actual performances were compared with the plans, and management efficiency, strength, and weakness were evaluated to improve the performances and to learn the lessons. The experience and lessons learned were used in the next phase and in the following projects.

24.5 MAIN CHARACTERISTICS OF SHENZHOU SPACESHIP PROJECT MANAGEMENT

The main characteristics of the Shenzhou Project's successful project management were systematic scheme development, dynamic configuration management and control, precise quality and safety management, integrated management by objective (MBO), and engineering parallelism.

24.5.1 Systematic Scheme Development

The project has 11 elements based on the features of a manned spaceship: configuration, schedule, quality, cost, reliability, security, software engineering, HR, procurement and material assurance, information and communication, risk and integration. Thorough and systematic planning is done during the research and planning phase. A project management plan is done at the preliminary research period of each spaceship, including the managing method, strategy, and subplans for all activities. The following list outlines the project's 11 elements based on the features of a manned spaceship:

1. *The configuration management* included the concise definition of the project technology, a brief introduction to the methods applied, the confirmation of the plan documents, and the compilation of the project explanation.
2. *The schedule management* provided methods applied and regulations adopted to clarify the time limit, accountability for each task, and sequences to compile a schedule baseline plan, and the project lifetime plan flow.
3. *The quality management* provided methods applied and regulations adopted to define the overall quality objective, the quality objective in each phase, and quality control standards, along with a compilation of the overall quality control plan.
4. *The cost management* provided methods applied and regulations adopted for cost management to compile reports on resources and budget, to clarify project cost, HR requirements, and all general equipments and facilities utilized during the project. The budget was done on an annual basis and was divided into job details.
5. *The reliability and security management* provided methods applied and related management rules to clarify the reliability and security requirements, to establish an organization for reliability and security to define the ranks of reliability and security problems, the measures to be taken, and the plans to be followed.
6. *The software engineering management* provided methods applied and regulations adopted to clarify the requirements of software engineering, established the related organization, and compiled the management plan.
7. *The HR management* provided methods applied and regulations adopted to clarify the project's organizational structure, team members and accountabilities, and other requirements.
8. *The procurement and material assurance management* provided methods applied and regulations adopted in procurement to clarify the list, quality standards, cost, time, and relative personnel, and to establish the project classification chart and suppliers list.
9. *The information and communication management* provided methods applied and regulations adopted to clarify and analyze the primary related project organizations and individuals, to draw out the information flow chart, and to compile project technological and managerial documents.

10. *The risk management provided* methods applied and regulations adopted to clarify all the possible risks, establish the relative organization to compile the risk evaluation matrix table, to define measures to be taken, and to establish the risk management plan.
11. *The integration management* was composed of project tasks, the technological plan summary, project results, overall project objective, technological objective, quality objective, schedule objective, cost control, ideology of the project, milestones, project phases, integrated change control, and so forth.

24.5.2 Dynamic Configuration Management and Control

An overall system in functional baseline and configuration baseline was established to realize the manned spaceship step by step. This would also guarantee the spaceship's success in case of configuration variation. The system could analyze and record the configuration and option changes of all software and hardware in detail at all levels, from a whole spaceship to a subsystem and a single unit. The system performed continuous track, check, and dynamic control to all units during the entire process.

Variation in configuration was the primary factor impacting the quality, schedule, and realization of the objective. A complete analysis was done to any relative operation, procedure, test, and interface that caused variation to configuration. Relative modification could be performed, details could be recorded into files and followed up, and the modification could be controlled and implemented.

The main control technology and methods in configuration control in the Shenzhou spaceship research was to *establish the configuration baseline.* Overall system function analysis, subsystem function analysis, and individual unit function analysis was performed prior to the establishment of the baseline. The function baseline and product baseline system were the referees for configuration variation comparison research.

Overall Analysis to Each Configuration Variation. While there was any configuration variation, a check to the interface and function baseline would be performed in the single unit and subsystem. A check report was later submitted to the system. The system would check each configuration variation in the system function baseline; this would check the influence to other subsystem interfaces, functions, and reliability. The relative operation, procedure, test, and interface that caused variations to configuration were analyzed thoroughly, and relative modifications were performed. All configuration variations were recorded into files and tracked.

Evaluations and the Assessements at Different Levels. Each configuration variation was evaluated strictly at different levels. Any variation to the whole spaceship was done at a system level; others were done at a subsystem level. There was an arrangement table for evaluation at different levels; the changes and the variations were managed according to how the table was arranged and updated accordingly.

Tracking and Follow Up. Various forms were applied in tracking configuration management, such as the following: configuration variation form, modification execution checking list, software modification form, configuration confirmation form, and so forth.

Five Strict Standards to Follow. Any alteration to the spaceship configuration at a system level, sub-system level, or main unit was discussed by the management team. The principle of "sufficient reasoning, test and demonstration, unanimous acceptance, complete approval, and thorough carry-out" was strictly followed. The configuration variation modification form should be filled. Any modification in relation to design plan, interface, key techniques, and test plan would be evaluated and demonstrated sufficiently, signed and confirmed, reconfirmed by the relative subsystem and overall system. Any configuration modification must be experimentally tested in advance, signed by relative personnel, audited by the deputy chief engineer, and approved by the project technology manager and project manager; crucial modifications were approved by the chief engineer.

Strict Record and Check in Implementation. During the assembly, test, and trial to a single unit subsystem and the whole spaceship, all the configurations on both spaceship and ground were strictly recorded and compiled into formal documents, which were compared with design documents to ensure the accurate implementation of configuration.

Compilation and Post-Factory Evaluation. The items, contents, reasons, approval, implementation, and test of spaceship configuration modification were compiled into a configuration modification report. A special evaluation was organized. After this evaluation, the whole spaceship was evaluated again prior to delivery.

Monitor Configuration Variation During Spaceship Test, Summarize After Test. Close attention was given to each configuration variation in the spaceship test. Further confirmation was required in a spaceship test summary, and continuous improvement was made to any tested problems.

24.5.3 Precise Quality and Safety Management

A system of forms for technology documents and the accountability network by the designers were effective measures to prevent quality problems. In addition to the "double five zero faults," the "zero faults in each step, in each phase," and "quality intersection analysis" were also applied, and this is the unique feature of the "no faults, no doubts, no failure" quality management ideology.

The follows are the main practice:

Process Management Fostered by Forms. Varous forms were extensively used in the process of the spaceship product design, manufacturing, assembly, final assembly, test and demonstration, which made the process more clear, easy to follow and avoided the mistakes. The forms were continuously supplemented and updated in the practice.

Test Overcast Analysis and Check. The overcast analysis and check was to cover the entire launch field test as well as all the operation modes and trouble modes on the orbit or during the return process before the delivery of the spaceship. Prior to a powered test of the spaceship, analysis on each item of the required test functions and primary technological indicators—normal operation mode, designed operation mode under trouble, and redundant design—was performed to distinguish immeasurable and measurable items. After the powered test, each measurable item was performed to check and countercheck the whole spaceship to ensure the overcast test requirements were met. There should be no missing test. The test overcast analysis and the check report were evaluated by experts.

Reading and Comparison of the* Fine Test *and Demonstration Data. Reading and comparison of the fine test and demonstration data was an important quality control measure to the spaceship. Those critical factors to key unit or key unit parameters were continuously recorded, first on the spaceship test, then after final assembly, and finally until the test before the launch; this effectively monitored the stability of the product test data. In addition to the comparison with the test value and design value, the last test values before leaving the factory were also compared to check stability. The report on the spaceship subsystem was examined by the two chief engineers. The switch to the next stage could commence only after their approval and confirmation.

Double Check Activities. To ensure there were no problems or doubts before launch, all staff was to double check on the launch field. They rechecked all the jobs done to ensure there were no problems or missing items, if there were any problems or missing items, they were to take the appropriate measures. They were also to forecast any possible problems and hidden troubles and if there were any, they would take the appropriate measures and execute closed loop management.

Key Technology Confirmation and Double-Checking. To ensure the conformance of the key design and test plan with the reliability and security requirements of the Shenzhou spaceship, counterchecks and reconfirmation of key technologies from external experts in this field were organized.

Reliability and Security Management for Astronauts. To guarantee the safety of the astronauts, unique control, analysis, tests, and demonstrations in key projects were developed during the research and development (R&D) phase. Control and management of residual danger was emphasized along with the analysis of sequences under emergency, the control of immeasurable items, and reliability and security testing.

Quality Problems Intersection Analysis. Prior to delivery of each spaceship, the spaceship project managing team organized all subsystems and unit R&D staff to countercheck equipment, materials, configuration control, key techniques, the firing device, product validity, standards implementation, and zero quality problems. All data and records were checked to avoid any doubt. Further checks were done to four cases: checks for previous quality problems, variation to configuration, failure to find launch field, and single points of failure. In addition to these checks, quality intersection analysis was done to each unit at different levels according to the intersection classification.

Product Quality Countercheck. Prior to delivery of each spaceship, specific counterchecks were organized. The main countercheck items were equipment, materials, configuration modification implementation, key techniques, firing device, product validity, and zero quality problems. The countercheck could continue on the launch field, which included the final assembly, test and demonstration, injection quality, and product quality.

Quality Control on Key Items and Immeasurable Items. Key items affecting the reliability and security were listed at the spaceship design phase. Key items were designed under strict evaluation. Detailed control requirements were listed for manufacture, testing, and demonstration. Techniques were under strict evaluation, and the implementation of techniques and test processes were recorded in details. Key items test and demonstration, overcast, and sufficiency of the test were under strict control. A key items control report would be compiled. Prior to delivery of key products, countercheck and quality evaluation were done to ensure the conformance of design, manufacture, test, and demonstration.

The immeasurable items listed according to the test overcast analysis on the Shenzhou spaceship at subsystem and system levels were key control contents in R&D. After final assembly of the spaceship, two main control methods to the immeasurable items were the control of the quality and reliability of immeasurable items related to products in the process of R&D during manufacture and prior to final assembly and the control of immeasurable items during the final assembly.

"Triple Zero Faults" Quality Culture. "Triple zero faults: zero disfigurement, zero doubt, zero trouble" quality culture was continuously enriched during the spaceship practice. The common quality objective for both the manned spaceship and systems was "no problems for delivery, no doubt for launch." The triple zero faults quality culture was based on the manned spaceship, fostered by scientific management, and enhanced by monitoring and caution. The objective of the culture is to realize a successful manned spaceship.

Zero Faults at Each Phase and Quality Analysis. While facing the high standards and the risk of a manned spaceship, the spaceship project managing team aimed at "zero faults, no doubt, and no worries." All problems were settled "openly, transparently, and immediately." All quality problems were reset to zero at each phase. The managing team conferred with all rounds of experts to avoid problems being transferred to the next stage. Any troubles incurred were solved thoroughly. Prevention measures, rules, and norms were set during the process to improve the overall technology.

24.5.4 Integrated MBO and Engineering Parallelism

The Shenzhou spaceship managing team achieved four spaceships at the elementary sampling and three spaceships at the final sampling within limited financing and time. R&D, manufacture, product design, technology development, and infrastructure were implemented simultaneously. Four lines worked parallel for one model simultaneously.

Manned Spaceship Schedule Divided into Parts for Implementation of MBO. The spaceship system objective was broken down into annual objectives according to the project objective and current situation. Further objectives at different phases were set for evaluation milestones according to project, R&D, key technology, subsystem, test and demonstration, reliability and security test, and so forth.

System Planning with Parallel Engineering. At the elementary sample stage, several spaceship samples were developed and tested on the main line at the system level. All technical data and information were shared; the technological interfaces between spaceships were key points for system arrangement. Under the general project flow, each line had independent project flow with an independent deputy chief engineer, supervisor, and technical staff. They worked independently and simultaneously. On the supplementary line, infrastructure and other outsourcing work were included in the schedule to coordinate with the main line activities. The schedule management quickly followed technological flow. At the end of one project, follow-up work could be activated in advance to ensure the timely completion of the project objective if the possible technological and financing risk was acceptable.

The project office arranged the parallel operation of the unmanned spaceship to shorten the first project period. Shenzhou-2, -3, and -4 could quickly follow Shenzhou-1 after its modification. Once a spaceship was ready to assemble, test and launch would be followed. Shenzhou-5 was arranged in parallel.

The project office divided the R&D staff into two teams with relatively independent schedule management under the supervision of a fulltime plan manager. While one team was on the launching spot, the other could be preparing for the next spaceship, and the team in Beijing could organize spaceship control and recovery during the launching.

Project Flow on MBO and Parallel Engineering. The spaceship project flow had consideration in three levels listed as system, time, and specific topic since the elementary sampling period. The purpose was to enhance parallel management and coordination. The system level included the overall spaceship system level, the single spaceship, each subsystem, and main and short line single units. The time level included the annual project flow, expected phases (single unit/structural manufacture, final assembly, important test), project flow, monthly schedule, and weekly schedule—this is mainly for system level arrangement—main or short line unit specific flow chart, phases (design, manufacture, test, and close-loop test), and flow chart—this is arranged mainly for subsystems. The specific topic level included software engineering flow and temporary specific flow. Lower level flow must match with upper level flow in the network chart and Gantt chart; flow at the same level was coordinated, and related required resources were considered.

Dynamic Evaluation of Risks in Schedule. During the process of multispaceships in parallel and intersection operation, any quality problems or technical difficulties at each stage could cause a serious delay to the whole project. The schedule control under certain risks was a vital factor to realize the objective. Dynamic evaluation was implemented in the whole spaceship schedule. Each stage of the spaceship and intersections between the stages were evaluated through weekly meetings, on-the-spot coordination, and specific topic meetings. The evaluation result was compiled into a key short-line list in system development and possible risk report (time delay). All critical pass activities were strictly controlled by specific plans (some activities were arranged in hours); in order to avoid or reduce the impact to overall objectives due to failure of a single task. A system network chart was adjusted as necessary.

24.6 SHENZHOU SPACESHIP PROJECT MANAGEMENT MATURITY MODEL

24.6.1 Shenzhou Spaceship Project Management Maturity Development Process

Through years of practice and exploration, Shenzhou spaceship project management maturity improved step by step. Its systematic engineering management maturity progress can be seen from the main work and milestone events in the management practice and exploration in the processes of the spaceship project.

The Shenzhou spaceship project management has made great historical progress from the traditional "two-line direction" management to the full modern project management, especially from the following details:

- **In planning—**from the "two procedures" to the full project management
- **In controlling—**from "control after occurrence" to "control in advance"
- **In variation management—**from the "short hold" to full risk management
- **In quality management—**from the "problem solving" to "problem preventing"
- **In standardization—**achieving the full forms management gradually and establishing the relatively complete standardization systems, etc.

Generally speaking, the process of maturity has been fulfilled through the stages of grouping to standardization, standardization to effective management, and effective management to integrated overall management (see Figure 24.9).

24.6.2 Shenzhou Spaceship Project Management Maturity Model

Shenzhou spaceship project management maturity conceptual model (SZ-PMMM/C) is an integrated project management model used for intercorporation, multiproject management based on the

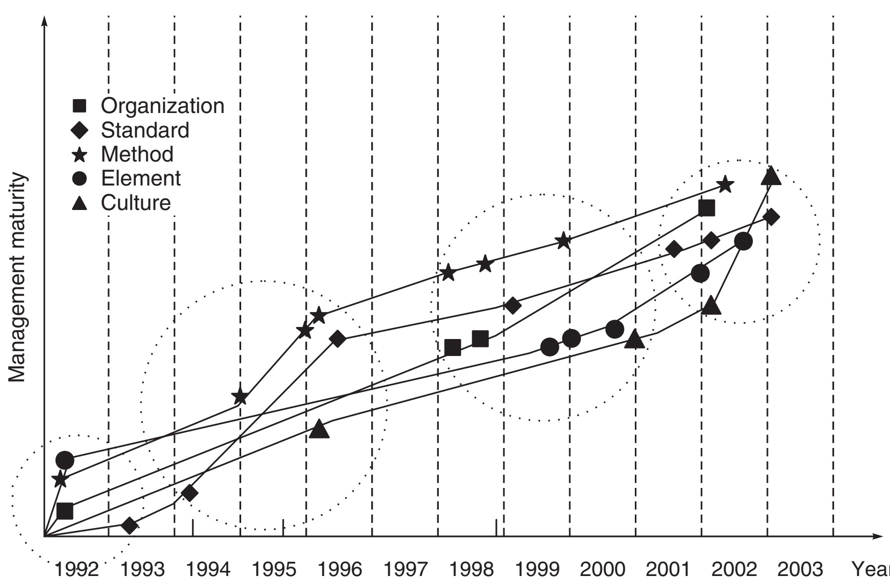

FIGURE 24.9 Shenzhou spaceship project management milestone events

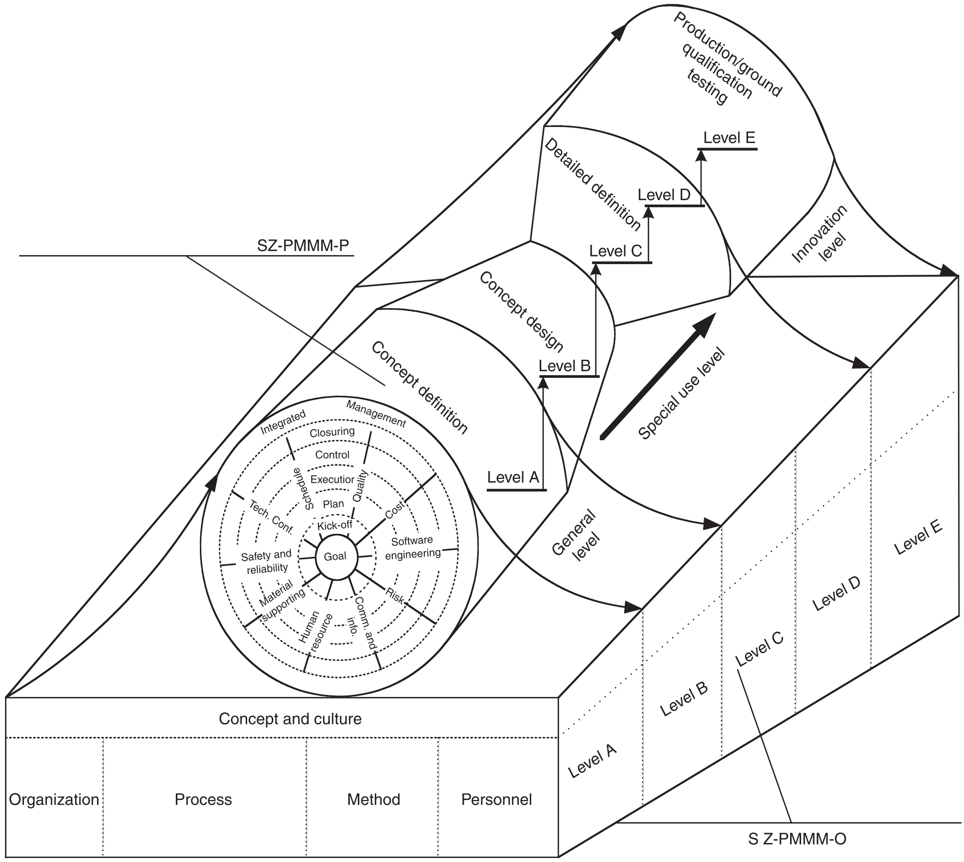

FIGURE 24.10 Shenzhou spaceship project management maturity model/ conceptual (SZ-PMMM/C).

characteristics of the spaceship and its environment (see Figure 24.10). It includes two relatively independent systematic project management maturity models: project management maturity model of organization (SZ-PMMM-O) and project management maturity model of project (SZ-PMMM-P).

In Figure 24.10 the echelon cube in the underpart symbolizes SZ-PMMM-O, and the echelon section symbolizes the elevation of the project management maturity model of organization. The echelon cube is divided vertically into two layers: the upper layer symbolizes the "soft" project management ability, with "concept and culture" as its symbol; the under layer symbolizes the "hard" project management ability, including organization, procedure, methods, and personnel. The cube in the upper part in the shape of a spaceship symbolizes SZ-PMMM-P and indicates the direction of project progress from outside to inside, as well as the process of elevation of project management maturity. The round sections in the Figure have marked out the key procedure of project management ability of organization and represent the elements of modern project management concerning the aims of joint various management elements (11 management elements in total) and management processes (five total basic process groups). The cube of the Shenzhou spaceship model lies over the echelon cube and is joined by the up and down arrows. It symbolizes that the project management organization ability constitutes the basis of project management ability of project, and its changing elevation will continually and directly affect the project management ability of the project. At the same time, the project management ability of the project itself will also progress in practice and consequently promote the elevation of project management ability of the organization. The two levels of project management ability promote one another especially in a multiproject organization. The accumulative system of the project management's ability of organization and the motive system of continuous reformation are strengthened to accelerate the maturity process of project management ability of organization, with the concrete elevation of project management ability of project as the final symbol.

24.6.3 The Application of the Shenzhou Spaceship Project Management Maturity Model

The Shenzhou spaceship project management maturity model (SZ-PMMM) is an integrated model of project management based on the maturity process and the development need of the spaceship project management. It has a much wider application space. Specifically speaking, with the direct purpose of developing the project management maturity model of the Shenzhou spaceship, SZ-PMMM has two typical applications. The first application is for Shenzhou's spaceship project office to use SZ-PMMM-P to evaluate its project management ability so that "evaluation will promote development," and its project management ability will constantly improve. Similarly, we can use SZ-PMMM-O to evaluate the project management ability of its subsystems and individual units to select qualified ones to carry out projects and to promote the elevation of PM ability of the participating units.

The second application is when organizations like the Chinese Academy of Space Technology can use SZ-PMMM-O to evaluate its project management ability so that, again, "evaluation will promote development" and constantly improve its PM ability. And similarly, we can use SZ-PMMM-P to evaluate the PM ability of various projects inside the organization to evaluate the project management ability so as to judge its level of desire to take improvement actions. We can also use the appended models (general, particular, and innovative) of SZ-PMMM-O to evaluate the discrepancies of project management abilities of various levels of projects in order to discover the innovative outcome of the various levels of project management and the useful experiences in raising PM ability. We will establish relevant systems and incorporate them into the organizational system of PM capability, and thus elevate the level of PM capability of the organization and finally elevate the PM ability of the various project-level organizations.

24.7 EXECUTION OUTCOMES OF SHENZHOU SPACESHIP PROJECT MANAGEMENT

The research, launching, and successful reclaiming of the Shenzhou spaceship project embodies the maturity of China's space technology. It is a great achievement in the history of Chinese space exploration and paves the way for the future space exploration. The main achievements of the Shenzhou spaceship project management are as follows:

1. Accomplishing the task of manned spaceship traveling and fulfilling its various requirements
   Accomplishing the research and launching of the first manned spaceship of China and achieving the various technologies, speed, and budget requirements at the confirmation of the spaceship project

2. Breaking through the key technology of a manned spaceship
   Through the developing and launching of Shenzhou-1 to Shenzhou-5, we broke through the key technology of the manned spaceship and more than 40 key technologies necessary for manned traveling, including environment control, life guarantee, instruments and lighting, artificial motion control, emergency survival, landing buffering, lift force control, humidity control, etc. The technologies are related to more than 20 subjects, such as mechanics, electronics, lighting, heating, acoustics, magnetism, materials, communication, biology, and medicine. And it has developed 300 technology standards and 200 product standards, thus paving the way for the further development of future manned spaceships.

3. Exploring and establishing the modern, large spaceship project management model.
Through the research, exploration, and bold practice by the developing and research staff of the Shenzhou spaceship project, the matrix form of management model has been applied in large, high technology aerospace engineering, and the project offices were established. The gathering of the decision-making authority of technology and management, and the gathering of the various factors of ranges, schedule, quality, cost, material, human resources, communication, risk management, and so on are also realized. Thus the project research pattern has changed from the two-line direction to the project manager system, and it has also established more than 200 management standards and the modern management system.

4. Establishing a team of specialists in the research of a model project.
Under the leadership and guidance of the senior experts, the Shenzhou spaceship research team gained project management experiences from both home and abroad and strengthened training and communication through experience and lessons learned. In the process of research and exploration, a team of young research and management talents are cultivated. Currently, they are in positions of leadership in key posts, or they have become the major undertakers of technology and management in other model research.

5. Establishing modern development test facilities in the world.
A highly modernized space development test center has been founded in the suburb of Beijing. And many facilities of world level have been established. At the same time, ground impact sites and parachute process facilities have been established in several other areas. These sites and facilities have greatly promoted the Shenzhou spaceship research abilities and test levels, and they also provide research and development. infrastructure base for other space projects.

6. Forming a manned spaceship spirit and Shenzhou culture.
During the project the team of the manned spaceship courageously faced challenges and maintained high spirits. They formed the spirit of the manned spaceship and the "Shenzhou culture," including the culture of "the paramountcy of the country's benefit," the innovative culture of "bravely climbing the technological summit," the quality culture of "zero defect, zero breakdown, zero disputed point," and the team culture of "we are in the same boat."

7. Writing a book.
After the successful launching of Shenzhou-5, the Shenzhou spaceship management team published the monograph of *Shenzhou Spaceship Systematic Project Management* in January 2006. The vice president of the International Project Management Association, Professor Qian Fupei, praised the book highly: *"Shenzhou Spaceship Systematic Project Management* is a genuine 'Chinese' and 'practical' project management book. It is writing under the basis of the long duration of experiences of the Chinese people in the great engineering project practice and the learning of the advanced theories and methods of international project management." The vice president of the China Military Commission, Cao Gangchuan, remarked, "I believe this book will not only provide guidance for the future engineering management of our manned spaceship, showing the way for the elevation of the management ability of our spaceship business and large spaceship engineering projects, but also play a significant role in the management of other high technology engineering projects."

8. Forming a maturity model.
After the Shenzhou spaceship project, the project team and Northwestern Polytechnic University project management experts jointly developed the unique Shenzhou project management maturity model, published and put into wide use in the spaceship and Information Technology industry.

CAST has decided to continue their project management practice and further enhance their project management capability, especially in the following areas: (1) the level of program and portfolio management, (2) emphasizing change management, (3) managing risk and opportunities, (4) setting up and updating the project management information platform and network, (5) paying more attention to project closeout and project post-evaluations, (6) further developing the learning and professional project management team, and (7) further developing the project management maturity model and improving the PM maturity, both in the enterprise level and in the project level.

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P • A • R • T • 6

THE THEORY AND PRACTICE OF PROJECT MANAGEMENT

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CHAPTER 25
PROJECT MANAGEMENT IN CONNECTION TO ENTREPRENEURSHIP AND NETWORK ORGANIZATIONS

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25.1 INTRODUCTION

Globalization and fast technological changes require organizations to develop competitiveness at the global level. This poses problems, particularly to small and medium-sized enterprises (Case Study of Slovenia-Baalsrud) with limited available resources, such as personnel, money, development, operational capacities, or knowledge. Therefore, it is urgent that these enterprises focus on selected business areas where they are likely to develop and reach global competitiveness. Other products or services required for performing their current or anticipated business activity can be procured outside their own organization on the global market. Generally speaking, the technologically developed companies from developed countries try to find production partners with inexpensive laborers for performing activities with lower added value. The organizations from technologically less-developed regions try to find business partners for development and transfer of new technologies to put into practice in their own companies. Of course, for the organizations from either developed or less-developed areas, there can be several reasons to find business partners outside their own organization. Here, the concern is with organizations wanting to develop by constant innovation in all areas of business activities.

Organizations also face the need to redefine and innovate the organization of their business activities. The concepts, offered by theory, issue from the theory of transactional costs, value management, network organizations, project management, industrial clusters, and regional development. This chapter will describe the basics of these theories, practical experiences, and the status of business innovation in Slovenian industry. Additionally, it will describe the status of project management in Slovenia.

25.2 TRENDS IN GLOBAL BUSINESS

25.2.1 The New Age Economy

Presumably, state borders will be a decreasing obstacle in international business activities. Here, not only the change of the economic order but also the great global cultural changes are concerned. In Figure 25.1, the following characteristics of change are identified under the umbrella of globalization:

- Globalization of products and services
- Fast technological development
- New global division of work
- Changes in locating economic activities
- Changed prospects for employment
- New global financial system
- Economy based on knowledge

Fast technological development has brought about not only an expansive and fast development of new products and services, but due to new technologies, technological development has also made the world smaller, particularly in the area of information science, telecommunications, and transport. Of course, the world has not become smaller physically, but the possibilities of communication, physical accessibility, and the information control of the world have increased and cheapened and continue to do so. One of the most important generic technologies is the Internet, which has ensured the beginning formation of a new economic order, just as steam engine technology ensured the development of the Industrial Age.

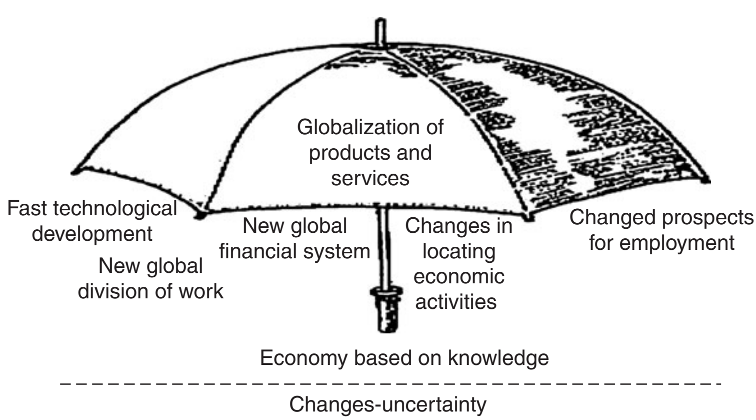

FIGURE 25.1 New age characteristics.

In recent decades in the area of global division of work, we have been facing the changes of the conventional work division pattern based on the assumption that the economically developed countries develop and produce industrial products, whereas the less-developed countries provide the raw materials and represent the market for these products.

That process of change started slowly developing immediately after the Second World War. In today's developed world economy, we already face complex and intertwined situations where the segmentation of economic activities and their relocation all over the world take place. New economically rapidly developing regions appear, which together with old centers of the developed countries form the new complex and intertwined whole of the global economy. The business associations are supported by modern information—communication and transport technology are intensifying between the individual regions. A new work division based on knowledge-oriented economy is being established. Those who have enough knowledge to develop the world's competitive offer will enjoy successful economic development, whereas those not managing to increase their knowledge will have to be satisfied with economic subordination.

This also implies changes concerning location of economic activities. Modern companies usually locate the individual segments of their economic activities in parts of the world where availability of the required resources and the cost structure are most favorable. Achievements in the area of information science, telecommunications, and relatively cheap transport enable the modern company to develop a network of its economic activity all over the world.

25.2.2 Searching for New Innovative Business Models

Modern companies are analyzing their business activities and the global market and searching for opportunities to improve the competitive capacities of their own company. New forms of network organization of the companies' business activities appear. These organize the individual business activities in the regions favorable from the business point of view with respect to the prices of labor, expertise, raw materials, and so forth. Transnational research and development and production networks are being formed, and their formation and development are influenced by the extent of business development of the involved countries, regions, national and regional government rules and regulations, social and cultural conditions, and so forth. The world becomes a more and more intertwined network consisting of a series of different transnational networks and specialized economic entities working in different parts of the world.

Analyses of the geoeconomic map show that business activities can be distributed or concentrated, but the tendency is to organize such activities in the frame of geographically localized clusters.[1] Porter defines a *cluster* as "a geographically proximate group of companies and associated institutions in a particular field, linked by commonalities and complementarities."[2] The industrial clusters can be formed as a result of the spontaneous development of a country or region or as a result of the implementation of the development policy of some country or region. Industrial clusters are often formed in close association with a certain industrial branch or sector. Companies and organizations operating inside such clusters have the tendency toward closer business collaboration and association. The industrial clusters include companies, banks, and educational and research institutions, among others (Figure 25.2). Usually, such associating has a favorable influence on the growth of the innovation capacity of the economy involved and on the increase of its business success. Industrial clusters are aimed at increasing the global competitive capacity of the included part of the economy in the selected area of its activities and, consequently, of the entire related geographic area.

The business interest is one of the basic driving forces for formation and development of the industrial cluster. Formation and development of the individual segments of the cluster can be one or several companies wanting in this way to assure better conditions for developing their own competitive capacity.

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[1] Dicken, P. Global Shift, 2003.
[2] Porter, M. "Cluster and New Economics of Competition," *Harvard Busniess Review*, Vol. 6 (1998).

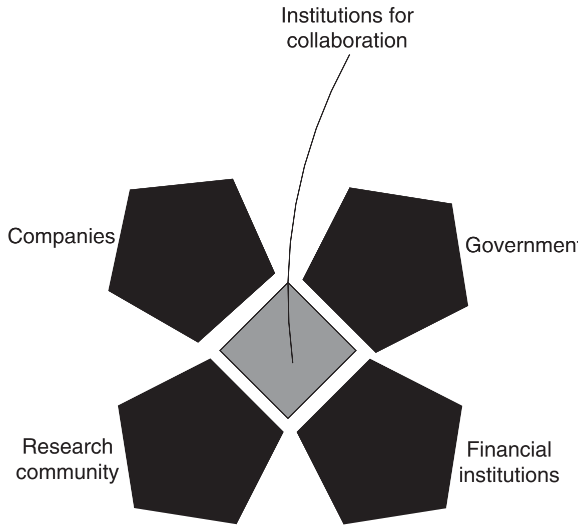

FIGURE 25.2 Partners of industrial cluster.[3]

Modern companies need to search and maintain their key competence on the global level. This generates problems for companies worldwide, especially for small- and medium-sized companies (SMEs) with limit resources. Clusters provide SMEs an opportunity to be more competitive on the global market. Such a small- or medium-sized company needs to see the cluster as an opportunity to develop a more innovative and efficient business model. The elements of the company's business model are the following:

- Fundamental business assumption
- Client selection
- Specialization and scope of work
- Differentiation
- Stakeholders value creation
- Procurement system
- Production system
- Go-to-market system
- Research and technology development (RTD) system
- Project management system
- Organization architecture design (OAD)
- Capital intensity
- Knowledge management (KM) system

The managers need to analyze each parameter of their company business model to find new ways of being more effective and efficient according to the existing and foreseen technologies and market situations (Figure 25.3). The harmonized permanent development of all elements of the company's business model can secure the company's long-term efficiency and effectiveness.

[3] Solvell, O., Lindquist, G., Ketels, K.: *The Cluster Initiative Greenbook,* Stockholm, 2003.

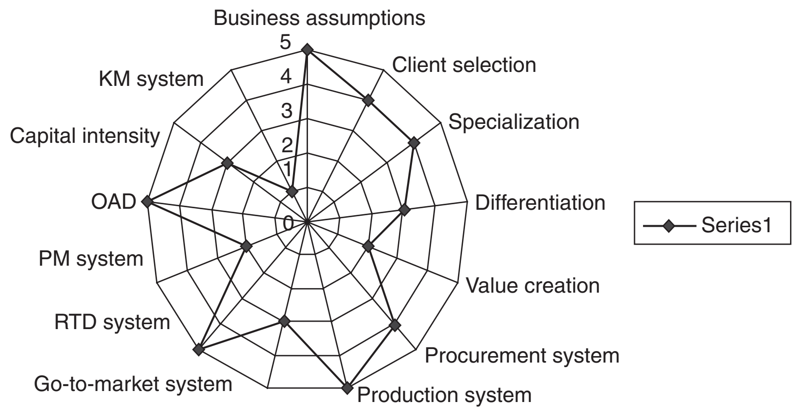

FIGURE 25.3 Example of the company's business model analysis.

25.2.3 Changes Obstacles

The organizations must know how to take advantage of the changes brought about by the modern business environment, otherwise the changes may cause trouble. The extent of changes does not decrease, but it increases. Permanent changes and insecurity are the basic characteristics of the new economic order, so businesses must move quickly if the changes are to be advantageous rather than troublesome. In spite of that, the changes in most cases are not implemented in practice as quickly as it would be desired. Why? Mainly because the execution of changes in a company's own environment is often a difficult task. It is easier to "let things happen." However planned activities, things do not usually lead to optimistic targets that are so often written in various development documents and usually related to the international competition and the increase of the competitive capacity of their own companies, sectors of economy, industries, regions, countries, and so forth. There are many causes for such situations:

- Lack of information
- Lack of required knowledge and qualification
- Non-innovative environment
- Wrong beliefs and habits
- Lack of correct motivation
- Lack of entrepreneurial spirit

When analyzing the facts common to all these reasons, we find that these are the problems that the modern management must be able to solve. Here the management as "activity and knowledge" and as "personnel performing the tasks" are met.

25.3 FROM THE MANAGEMENT THEORIES TO THE PRAXIS

25.3.1 Entrepreneurship

"Few entrepreneurs invent things that change the way millions of people work . . ." Who are successful entrepreneurs? According to Kuemmerle, the successful entrepreneurs have the following characteristics:[4]

[4] Harvard Business Essentials: *Entrepreneur's Toolkit, Harvard Business School Press*, 2005.

- They are comfortable stretching the rules.
- They are prepared to make powerful enemies.
- They have the patience to start small.
- They are willing to change strategy quickly.
- They know how to close a deal.

We can find successful entrepreneurs in all industries and businesses. The entrepreneurs often face the problem of how to implement their ideas into the praxis. We have a number of people with great ideas—but just few of them have enough knowledge and competence to make their ideas into a reality. A successful entrepreneur has the ability to identify and develop a business opportunity and to realize the purpose of it is commercialization. Entrepreneurs need to have a specific personal attitude and a good understanding of the business idea application area. (See Figure 25.4, the industry/business framework.)

The successful manager must be able to simultaneously manage the problems and challenges of entrepreneurship and strategic and project management (Figure 25.4).

25.3.2 Problems of Strategic Management

Business environment is interlinked by complex processes, and managers find themselves in a very difficult position when forecasting the company's development. The concept of strategic management enables the managers to reduce by means of various methods and instruments the complexity of environment to controllable and clear processes (within certain limits) and to design and implement on this basis the strategy to further develop a company. The strategic management concepts, however, have their own deficiencies and limitations. Within the reasons of failure at strategic planning implementation, the first place goes to difficulties in implementing company strategy. The criticism that managers address to strategic planning and strategic management today are mostly directed toward difficulties in implementing company strategy, the first problem here being the time gap between the strategy design (i.e., start of strategic management process) and the implementation of company strategy.[5,6]

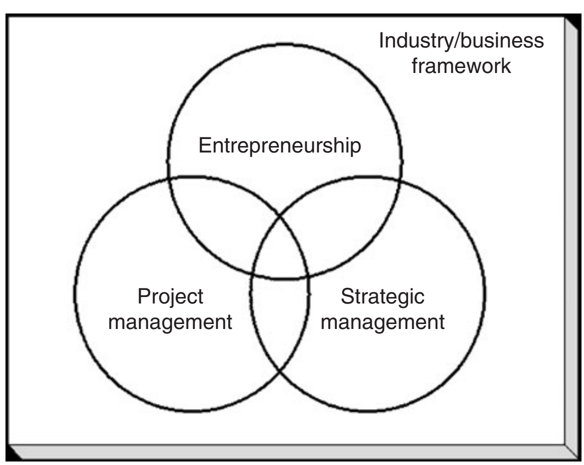

FIGURE 25.4 Interrelation between different concepts.

[5] Birnbaum, W. *If Your Strategy is So Terrific, How Come it Doesn't Work,* Amacom: New York, 1990.
[6] Macmillan, H., Tampoe, M. *Strategic Management,* Oxford: Oxford University Press, 2000.

Limitations to strategic planning and strategic management are linked on one hand to the model and on the other to execution of strategic management process. The model of strategic planning and strategic management must be developed with outstanding focus on the company's strategy design. Various techniques of analyzing and designing company strategies must be developed to perfection. Due to incomplete development of the strategic management model, the development of strategy has been set as a goal rather than reaching the goals set in the strategy.[7]

In the process of implementing strategic management, difficulties occur and thus impose limitations on various levels accordingly. The first concern is connected with time allocation and energy of employees at the implementation of strategic management process. Owing to partial development of the strategic management model, the employees consume most of their time elaborating on the company strategy. Besides disproportionate time allocation in the entire process of strategic management, the time required to elaborate and implement the strategy is too long.[8]

In addition to the problems arising from the time dimension issue, limitations of strategic management also occur in the field of organization of strategic management process implementation. The key issue here is to form an effective organization scheme of the strategic management process that will not have a rigid structure orientation. Without any doubt, there must be a certain organization structure of the total process, but we must pay attention to the fact that the strategic management process doesn't become more important than the achieved result.

Several factors influence the effectiveness of strategy implementation. These are mainly the factors that form the total process of strategy implementation organization structure, organization culture, and control process. These factors can be supplemented by appropriate knowledge, skills, and motivation of employees, and allotment of necessary funds. The success of implementation doesn't depend only these factors but also on its very realization and flow of process realization. Within the strategy realization, a special emphasis should be given to the timely start, systematic management, and professionalism of design, implementation, and supervision of the entire process.

25.3.3 The Role of Project Management

Project management has two important characteristics for the modern business environment. The first characteristic of project management is to merge various profiles of experts, funds, and other required resources for solving the problem or task in order to reach the set objective. In a complex, up-to-date business environment, the interdisciplinary approach is vital. The other feature is the efficiency of project management. Compared to the classic way of management and functional approaches, the project form is more than merely effective; it is fast. Time is a critical resource; therefore, achieving the set objectives quickly and with quality of is a competitive advantage.[9]

The key objective of the link between strategic and project management is to increase performance at the implementation of company strategies.[10] The classical strategic management model is splitting the processes of formulation and implementation of company strategy. This represents interrupting the process of strategic management and transferring and delegating competences onto other levels for realization of company strategy. This duality (strategy formulation and implementation) represents a great obstacle and is the key reason for all the difficulties while implementing the company strategy; therefore, the duality of the strategic management process should be eliminated by launching a new stage onto the model of strategic management process.

The new stage named "start-up and implementation of results," represents a systematic approach to implementation of the company strategy. Start-up and implementation of results of individual stages represents a breakdown of the results of strategic process stages into activities and projects. This stage represents one of the most creative processes of company strategy implementation, but it is also one of the most risky points at the implementation of company strategy. It can even be said

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[7] Hahn, D. *Strategic Management-Tasks and Challenges in the 1990s, Long Range Planning,* Vol. 24, No. 1. London: Pergamon Press, 1991.

[8] Judson, A.S. *Making Strategy Happen.* Oxford: Basil Blackwell, 1990.

[9] Lock, D. *Project Management*. Gower: Hampshire, 2000.

[10] Grundy, T., Brown, L. *Strategic Project Management*. London: Thomson Learning, 2002.

that top management, by breaking down the results of the strategic process stages into activities, performs division of work on implementation of company strategy. This means delegating tasks and competences to individual employees in the company by maintaining supervision and cooperation at the same time. The content of the new stage of strategic management is that individual stages of process systematically and professionally pass over to implementation. The function and role of the stage of start-up and realization of results representing an integral link of activities is that, on the basis of instruments and methods of project management, all the required activities are set for defining projects by means of which individual stage results of the strategic management process will be realized. This, in turn, will raise the professional level, and it will also increase the efficiency of realization of the entire process of strategic management.

Launching the new stage onto the existing model of strategic management processes is run on the integration basis. The start-up stage and realization of results is integrated into the individual stage of process of strategic management. Integration of the new stage into the existing processes represents time savings and eliminates classic difficulties at interstage links. So in the new model of strategic management, the present duality between realization and implementation of company strategy is being eliminated. The new model no longer has independent stages of forming organization structure and culture; the adjustment of organization and culture of the company to the selected strategy is already included in the activities of start-up and implementation of the company strategy. Each stage in the new model connects design and implementation. It links elaboration with the set basis of activity structure for its implementation.

Effectiveness and efficiency of realizing the company strategy were supported by process approach by launching an additional stage. The content of the new stage is systematic and professional definition of results implementation in each of the quoted stages within the strategic management process. Each stage in the process of strategic management contributes to the effectiveness of the end result of the process—this in turn is effective and efficient implementation of the company strategy. Systematic delivery and professionalism of the new stage is based on the project management. Application of work methods of project management ensures a high degree of efficiency. Further insurance to improve effectiveness of company strategy implementation is to include the top management in the process of implementation itself. The top manager, being the bearer of the results formation in individual stages of the strategic management process, joins via the new stage with his or her activities in the implementation process itself, thus ensuring a higher level of effectiveness and efficiency of the entire process.

The linking of strategic and project management is run on different levels. For a final design of the new model of processes, regarding project-oriented strategic management, a completion of each stage of strategic management is required with the stage of start-up and implementation of strategy.

Execution of both models' integration is done directly over integration of managerial functions. Therefore, the next linkages can be set for the management functions. Management functions are based on the basis of strategic management. This means that dimensions and implementation of functions of management are conditioned by strategic management requirements. So planning is based on the concept of strategic planning; management process requires consideration of strategic management elements; control includes strategic supervision, and so forth. Functions of project management comprise specific activities for the needs of the way the project works. At integration of both systems, a similar relationship is attained, as at goals. Here, too, functions of project management are a part of management functions. Management functions have to be completed by project management functions. The integrated system is represented by managerial functions that combine strategic bases as well as principles of project management operation.

25.4 NETWORK ORGANIZATIONS

25.4.1 The Need for a New Business Organization

The *organizational structure* is defined as the methods used by an organization to break down its operation into individual business activities and how it coordinates them. The organizational structure is a means by which the management realizes its business targets from the organizational point of view. The process of forming an organization is based on the analysis of the strategic targets and business environment of the organization. The findings so gained help to establish the organizational structure, the adequacy of which must be continuously verified. In the present time of ever-occurring change, it may soon happen that the existing organization no longer meets the actual needs of the business.

The conventional organization of the business activities was based on the high level of the organizational structure and support by the work rules and regulations defined in detail. Modern organization, which has to satisfy the needs of the unstable and fast-changing environment, is based on loose management elements such as business targets, strategies, and values. The concept of network organization may be defined as a particular level in the development of organizational structures.

The bases of the theory of companies' organization in the Industrial Age as set forth by Max Weber, Frederick W. Taylor, Henry Fayol, and their contemporaries came from the bureaucratic model of the organization and business activity structure. The principal characteristics of such organization are the hierarchy, relative impermeability, and rigidity. Such a type of organization was adequate for the companies of the Industrial Age since the business environment was relatively stable. Today, we face the needs of fast development and permanent adaptability; therefore, such organization is inadequate. Recently, various forms of network organization have appeared in answer to that problem.

25.4.2 Definition and Management of Network Organization

There is no doubt that the so-called network organizational integration represents one of the most popular organizational concepts at the turn of the century. It is equally possible to argue that the expansion and importance of network organizational structures will continue to grow in the future. Intercorporate integration is expected to gain importance and assume different forms and dimensions compared to the familiar ones of today.

In professional literature the term *network integration* may be found in different fields of activities, namely, in the area of information science, linguistics, psychology, sociology, and the like. In the area of organization, we also speak about network connections at various levels and fields. Some authors include in network connection various forms of intercorporate cooperation; for example, strategic business integration cooperation, cooperative associations between suppliers, intercorporate network collaboration, joint ventures, virtual companies, network organizational structure, and so forth. The appearance of network organization may be defined as a particular level in the development of organizational structures.

Multiple forms of network organization have been formed in actual practice. There are several criteria for their classification. They may be grouped according to their origin. Different authors[11,12] distinguish between concepts and terms arising from organizational and managerial practice (e.g., strategic linking and joint ventures) and those created as a consequence of scientific research. However, regardless of their origin or design, network organizational structures tend to display the following common features:

- They represent a specific model of intercorporate collaboration.
- They outline collaboration between particular participants (individuals, groups, corporations. and corporate groups).
- Reciprocal harmonization (consolidation) is carried both by means of hierarchic and market relationships.
- Reciprocal connection is present.
- Participating corporations may be economically independent.

[11] Snow, Miles, and Coleman. *Managing 21st Century Network Organization, Organizational Dynamics,* No.3, 1992.

[12] Jarillo, J.C. On Strategic Networks, Strategic Management Journal, No.1., New York, 1988 and *Strategic Networks.* Oxford: Butterworth-Heinemann, 1993. 2nd edition 1995.

- Complex reciprocal relationships in various fields are established (information, human, technological, and financial).
- There are both dynamic and solid connections.
- Major features are decentralization, heterogeneity, dispersion of power, and deciding authority.

The expansion and development of complex network connections were fueled by the following:

- Development of information and communication technology
- Increased importance of time as a competitive element
- Increase of competitiveness (globalization) as a prerequisite for the need to join different resources in corporations
- Growth of resources for research and development
- Disappearance of national economy framework and creation of global market

In the conception and maintenance of network business integration between two or more corporate organizations, there are two fundamental sets of activities for the management. The first set is comprised of specific activities related to the design and maintenance of network integration. The second set consists of activities related to the traditional managerial tasks (e.g., planning, organization, administration, and control). Activities related to the creation and maintenance of network organizational structures include the following:

- **Set-up of network connections.** The beginnings of creating network connections are represented by the search for potential partners. Particular corporations maintain various connections within their environment, whereby it is by no means imminent that network integration takes place on the basis of existing business contacts. Network integration may arise as a result of systematic search for potential business partners for any particular kind of cooperation.
- **Exchange between partners.** This comprises the participation and requests for the interchange of products, services, finance, know-how, information, experts, and so forth. The exchange is intended to satisfy the requirements of all partners included in the network.
- **Coordination.** The task of coordination is reciprocal consolidation and harmonization of functions of each participant within the network. Coordination of mutual performance of corporations represents the central responsibility in the functioning of the network. Particular corporations included in the network may not be expected to *always* have a completely identical image of future development objectives, *always* completely agreed interests, and *always* dispose of identical resources and potentials. To achieve the required degree of internal harmonization and attain agreements within particular areas, certain coordination processes must be established.

It was mentioned earlier that two of the most important properties of intercorporate network integrations are their polycentric and heterogeneous nature. This, in other words, means the existence of decentralized decision making and joint discussions in regard to the following forms and methods:

- Defining objectives (strategies) of development and performance
- Realization of set objectives (strategies)
- Carrying out mutual coordination

Each network intercorporate association is bound to devise a system of management that is able to take the coordinate role within the network. The coordinate managerial system means implementation of management at the traditional level. No doubt differences do existence between the execution of managerial tasks within the traditional corporate concept and the function of management in the coordinate role in network organizations. The differences are reflected in the following:

- The system of management for the coordination requirements within the network exists only as long as the network is active.

- Authorizations and powers of management in charge of coordination within the network are not comparable to the authorizations of management in the traditional corporate environment.
- The duties of coordination management within the network may be delegated to multiple executives.

Despite these features, it is important to emphasize that the managerial processes are related to a certain form of integration which must be formed in order to ensure the functioning of the network as a whole. It is possible to identify three types of managerial coordinate systems:

- Only one partner carries out the coordination processes.
- There is a dispersal of coordination processes between partners.
- There are autonomous models of integration.

The first model is doubtlessly the most frequent method of carrying out the coordination processes. The last one mentioned (the autonomous model) is suitable during the first phase, in the creation of intercorporate network integration.

The central issue in providing the development and performance for the intercorporate network is achieved by *strategy*. Strategy represents the initial point of management function, and it is the nucleus for the concentration of particular managerial activities. Designation of core strategic policies is by no means simple. Exposing those shared issues that may serve as centers for designating the overall strategic policies is necessary. Joint strategy represents the guidance for managerial behavior within the network, especially in central issues such as allocation of network resources and evaluation of realized business objectives.

The duty of the management in traditional corporations is to allocate and distribute financial and material resources as well as the human potential between particular assignments. Allocation of resources is also one of the paramount managerial tasks in network integrations. The difference is that the management of network corporations mostly carries out the allocation of human potential, technology, autonomy, and support for particular assignments.

Regardless of the network integration hierarchy, the task of the management is to create an integral and uniform system of responsibility. This may be obtained by application of particular managerial techniques—the management by objectives (MBO) for example. But in most cases, particular corporations and managers just take the authorities and responsibilities arising from key organizational opportunities.

In creation of intercorporate network organizations, the dominant components are reciprocal processes and required elements of the mutual organizational structure. The fundamental objectives of creating network integration are the following:

- Establish efficient functioning of intercorporate processes—required for the realization of mutual tasks.
- Create joint elements of the organizational structure—required for the execution of managerial coordination processes.

In the intercorporate network associations, the central place is taken by the processing dimension of the company, so the chief assignment in creation of the organizational network associations is the optimization of the complete process of manufacturing the product or performing the service—in regard to the elements of time, cost, and quality. It is also very important to obtain optimum results both from the aspect of particular partial processes, as within the process as a whole. The prerequisite for the optimum performance of the entire process within the network is the standardization of certain elements and parameters of the process.

Creation of the structural dimension of the intercorporate associations is related to the opposing requirements. While on one side the structures require relative consistency and are used as a basis for the architecture of management system for the performance of coordination processes, on the other side networks are by definition decentralized, flexible, and temporary organizational structures. The network integrations, therefore, include both the elements of constant and temporary structures.

Mixing constant and temporary elements within the organizational structure of the network organization creates a bipolar organizational model. Reciprocal activity of constant and temporary organizational structures may lead to difficulties in the performance of the organization. Problems may be anticipated, especially in the collaboration of both participants in the area of assignment transfer. It is therefore advisable to unify methods and working techniques up to a certain point and thereby improve the cooperation of both elements.

25.4.3 Projects of start-up and development of industrial clusters

Dynamic industrial clusters can play a favorable role in the process of promoting and supporting the regional business networking processes. Industrial clusters are formed as a result of simultaneous development projects on the macro- and microeconomic level.

At the macroeconomic level, the development projects connected with the industrial policy of the state or region are concerned, namely, with the following:

- Projects of identification of economic areas of potential business clusters
- Projects of development and establishment of instruments to promote formation and development of clusters
- Projects of development and introduction of following up the success of business clusters
- Projects of development of the cluster infrastructure
- Projects of establishing association and support in a wider region (development cooperation with governments in the region)

Development projects at the microeconomic level are comprised of the following:

- Projects of establishment of pilot applications of business clusters
- Projects of specialization and establishment of soft and hard forms of business networks within the industrial cluster, executed by individual companies
- Projects developed within jointly agreed upon areas of business cooperation and coordination (selected business areas which are the subject of joint interest and cooperation)
- Projects of development and establishment of joint venture companies and organizations
- Projects of "virtual labs" starting up
- Projects of joint ventures in pre-competitive research
- Projects of development of joint cluster project office

Figure 25.5 shows the connection of the macro- and microeconomic development projects with the business success and efficiency of the business cluster. By cofinancing the development projects at the microeconomic level, the state promotes formation and development of business clusters. Execution of proper microeconomic projects at the level of cooperating companies and organizations assures the growth and development of the global cluster competitiveness.

25.4.4 Enterprise Project Oriented Network-Flexible Organization

Taking into account that corporations operate within dynamic environments requiring constant adjustment and development, it is possible to surmise that the characteristics of a sophisticated corporation are its dynamics, flexibility, and quick adjustment, with an everlasting mixture of operative business processes of adjustment and development requiring different approaches due to their mutual differences.

In order to provide adequate management of business processes of the operation, adjustment, and development; complete familiarity with the details of the basic principles regarding particular business processes is imperative. Closer study of the fundamental properties of described types of

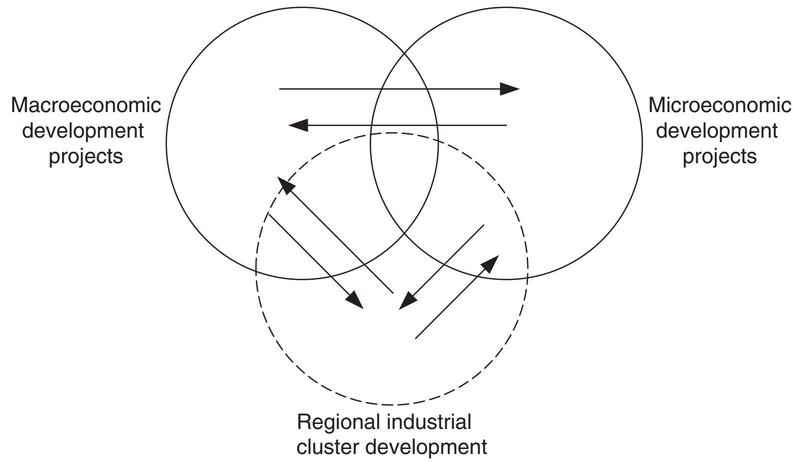

FIGURE 25.5 Connection of macro- and micro-economic development projects with the business cluster success and efficiency.

business processes reveals that there are actually two types of business processes, namely, *repetitive* (continued business processes) and *non-repetitive* (unique types of business processes).

Continuous business processes are characteristic for the operative business processes featuring serial, mass production, and other similar types of production where repetitive business processes must be dealt with. From the content and quality aspect, such processes remain relatively unchanged. Particular processes differ from each other only in regard to the volume of realization (quantitative dimension) of the already apprehended product/service. Within the network organization it is the matter of carrying out the standardized and agreed upon productions and services performed by the corporations, participants in the business network. Apart from the mentioned examples, such business processes may be identified also within the business areas (in any company regardless of the characteristics of its basic activity or operation) that provide the required infrastructure for the performance of the basic business management activities of the company.

Unique business processes (projects) are present in all companies, whether within the performance of their principal line(s) of business (operative business processes) or within the realization of processes of development and adjustments of the company. These are considered as non-repetitive processes, aimed at realization of single objectives. Essentially, this means innovations and innovation processes. In network organization such processes are performed within one corporation, within two of them, or within the entire network of participating organizations.

Comparison of functional features and activities of the managerial process required to apprehend particular types of business processes reveals that they differ considerably from each other. One of the basic differences indicates that in the management of continuous business processes, these functions are related to the company resources, while the projects also include external resources outside the corporation or business network of participating organizations. The term *resources* here denotes all the capacities and other means at the disposition of the manager, employed to realize the set objectives mutually agreed upon. These objectives are situated within a certain period of time (week, month, quarter, year), and they are monitored by analyzing the operation of a current period and comparing it with the preceding one. In the case of project management, one deals with planning, organization, guidance, and controlling the resources aimed at the realization of single objectives within the specifically determined period of time. There are numerous differences between the management of continuous business processes and the management of projects. Levine (see bibliography), underlines the following features of project management, essential for the distinction between the general and project management, and related to the administration of continuous business processes:

- It is not obligatory to employ exclusively the potentials of the company—we may use the potentials of other corporations participating in the project.
- Management of the project is a unique process, executed during the period of the performance of the project, which is precisely defined.
- It is necessary to realize precisely defined objectives, also of a single nature.
- Controlling of the project performance is structured according to a particular extent of work or a stage, required to be accomplished, and not according to periods of time as it is the case with the management of continuous activities.

It is important to mention that the execution of projects usually requires greater "intellectual contribution" from participants, compared to the activities arising from the continuous regular business processes. It is equally important to indicate that the organization of work required for the execution of unique processes or projects is completely different from the organization of continuous business processes. In the first instance we are discussing different forms of project organization, with completely different characteristics and principles compared to the functional organization, which is otherwise usual in the execution of continuous business processes.

Obviously, particularities exist that demand different models of organization and execution of management functions. The ideas presented here are above all different manner and approaches to planning, organizing, administrating, and controlling of business processes aimed at realization of set objectives.

Basis for the creation of the modern organization of a company are strategic business units (SBU) through which the company markets its products and services. Smaller permanent units may be created within the SBU (both within and outside the company) with the task of performing operative duties. For the adjustment and development requirements, the required organizational background for the creation of temporary project groups must be provided, with the task of resolving unique problems.

At the strategic level there is the management of the company, which also has the permanent corporate organizational segment consisting of the top management with the general administrative support and temporary groups formed for the performance of projects in regard to the adjustments and development at the level of the whole company. The employed associates have multifunctional responsibilities, meaning that they may be members of one permanent group and members of another project group at the same time. In regard to the levels of authority, such modern organization may be asymmetrical in the sense of divergence, arising from the comparison of operative work within particular SBU.

A great contribution in providing conditions for reducing the number of managerial levels within a company and greater business integration into network organizations must be assigned to the tools of modern information technology, which simplifies the communication and the performance of various forms of virtual organization.[13] By the definition of David Gould,[14] a virtual organization can be thought of as a way in which an organization uses information and communication technologies to replace or augment some aspect of the organization. People who are virtually organized primarily interact by electronic means.

Another important element which must be taken into consideration in the implementation of modern, flexible, project-oriented organization of work within a company is the cultural environment in which the company functions (Figure 25.6). The idea is the reflection of general culture, displayed in the form of the organizational culture of a company, and comprises a multitude of values, prerequisites, and confidences, which consciously or unconsciously influence the mode of conducting company business. If the organizational culture in the company is at low level, there is great possibility that organizational changes only may not yield worthwhile results. The outcome of an extensive survey, performed several years ago by Denison (see bibliography), has indicated that

[13] Byrne, J., Brandt, R., Port, O. "The Virtual Corporation." New York: *Business Week*, (8.2.93), 1993 and Davidow, W.H. in Malone M.S. *The Virtual Corporation.* New York: Harper-Collins, 1993.

[14] Gould, D. "*Virtual Organization*." daveg@seane.com, on Internet published paper, 2006.

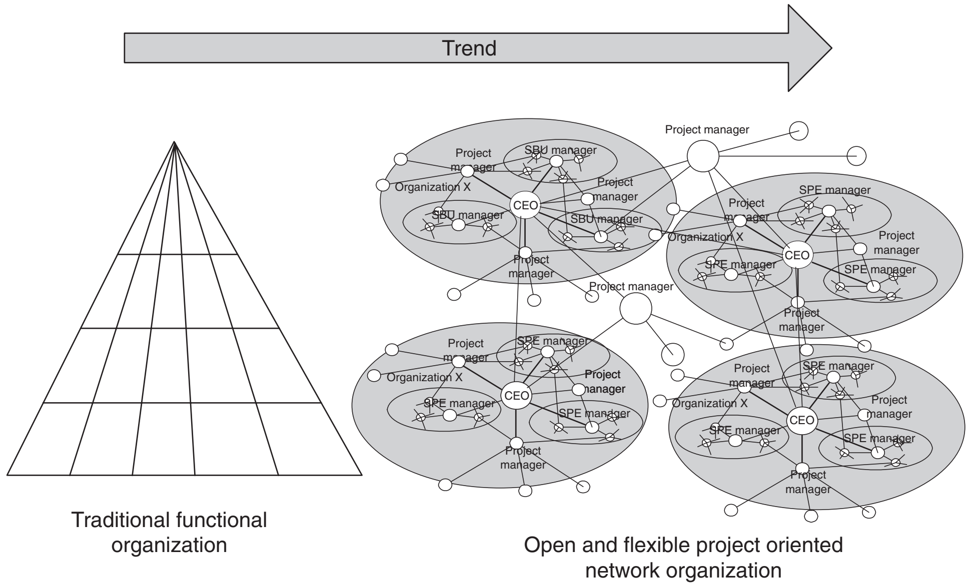

FIGURE 25.6 Flexible project oriented network organization is much more effective in today's unstable business environment.

the difference between companies with good business results and those with bad ones in most cases depends upon the propensity of employers, their values, and motivation—or in other words, upon the level of the organizational culture of people included in the process. The organizational culture is implicitly related to the strategies of the company, organization, and organizational level of the company, and methods of managing the company. Harmony between the organizational culture in a corporation and adequate organization and management enables the company to function rationally and efficiently with minimal, informal inspections.

25.5 CASE STUDY: EXPERIENCE FROM SLOVENIA

25.5.1 Project Management in Slovenia

Project management as a profession has a long tradition in Slovenia. The first study courses at universities appeared in the 1960s into the 1970s. Up to the end of the 1980s, project management was used mostly in the area of the construction business, IT, and information system development, and in the field of new products development. Project management became popular in all areas of business in the 1990s. The driving force was emerging instability of the global and regional business environment and the need for permanent changes and fast development of companies' and government bodies' business designs.

The National Project Management Association was established in the mid 1980s, and it was part of the former Yugoslav Project Management Association. After the Yugoslav disintegration, and when Slovenia became an independent country in the beginning of the 1990s, the Slovenian Project Management Association (ZPM) was established. The ZPM became a full member of IPMA (International Project Management Association) in 1992. The ZPM introduced the first project management certification services into the Slovenian market in mid 1997. The first certificates were delivered to the professionals during the fifteenth IPMA World Congress in Ljubljana (Slovenia) the next year. Since then ZPM organizes certification services for project managers each year.

Project management became recognized as an independent profession at the national level in the 1990s. The teaching of project management is now part of the curriculum on almost all Slovenian universities. The first international degree in project management, organized by a consortium of seven European universities, is in the phase of accreditation (www.eurompm.net).

25.5.2 Clusters and Business Networking in Slovenia

Slovenian economy is mostly represented and powered by the small- and medium-sized companies. The most represented industrial sectors are automotive, household appliances, machinery, electronics, pharmaceutical, and service industries. Global competition and rapid technological development force companies to focus on their key competences and search for regional and global outsource partners. This process was started in the 1990s, and it currently has characteristics of exponent growth. To enhance and support the specialization, outsourcing, and networking processes, the Slovenian government started to support industry clusters and networking projects in the year 2000. This decision was made according to the results of extensive mapping research, which had the goal of looking for potential clusters. On the basis of these results, an open call was made for the first pilot cluster of initiative projects on the national level. In this stage the decision for three pilot cluster projects was made. The proposed projects from the automotive, toolmakers, and transport industry were awarded. The results of the first pilot projects followed with an open call for a new cluster of initiative projects support. This government initiative produced 16 new industrial clusters including the following:[15]

- 335 small- and medium-sized companies
- 72 big companies
- 80 research and development institutes
- 29 supporting organizations (for example, chamber of commerce and regional development agency)

The partners in all clusters started more than 240 joint venture projects. These are the most common areas of cooperation:

- Joint R&D projects
- Joint promotion and related projects
- Joint commercial projects
- Joint infrastructure development
- Education and training

Most of clusters established solid international links and cooperation with similar or complementary clusters and networks. Figure 25.7 illustrates the regional Toolmakers Cluster of Slovenia (www.toolscluster.net).

The Denison (see Bibliography) survey shows that companies see clustering as beneficial in many ways, including improvement of new technologies and know-how acquisition processes, improving the international market visibility of companies' and their abilities to perform bigger projects, as a better approach to the international supply/production chains and networks, as enhancing the companies' competitiveness, and so forth.

25.5.2 Projects, Project Management in Clusters and Networks[16]

In the existing clusters and networks we can divide all projects into two classes. The first class presents the joint cluster projects (JCP). The basic purpose of these projects is to build up the cluster's infrastructure in the following ways:

[15] M. Jaklic et al. *Final Report, Faculty of Economics,* Ljubljana: *University of Ljubljana,* 2004.
[16] Semolic, B. *Technological Development Strategy of Toolmakers Cluster of Slovenia, TCS*. Celje, 2004.

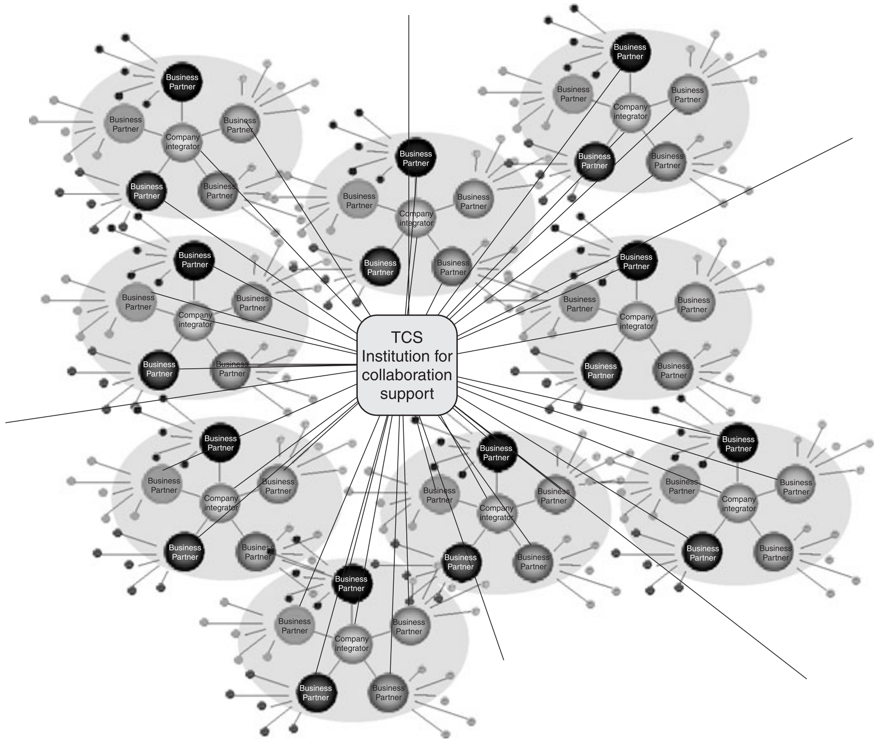

FIGURE 25.7 Illustration of Toolmakers Cluster of Slovenia—the regional set of collaborative networks.

- Projects of cluster office services development
- Projects of IT and telecommunication infrastructure development
- Cluster Internet services development projects
- Cluster marketing projects
- Cluster pre-competitive research projects
- Cluster R&D infrastructure development projects
- Strategic project office services development projects
- New education or training program development project

These projects are usually financed by the cluster representative office and other interested parties (regional development agencies, different governmental agencies, etc.).

In the second class of cluster development projects we can find companies' development projects (CDP). Usually, a company (integrator) sets up a project consortium composed by the business partners. Partners can be other companies and institutes from the same cluster, or they can be partners from other clusters and networks. The business interest is a primary motivation for the active participation in such project consortia. Here are some CDP examples:

- Pre-competitive research joint venture projects (e.g., High Performance Manufacturing project)
- New technology acquisition joint venture projects (e.g., Laser Engineered Net Shaping project)
- New intra-organizational services development projects (e.g., Open Code ERP SW development project)
- New product development projects (e.g., Start-up of the company for the new production and virtual modeling services).

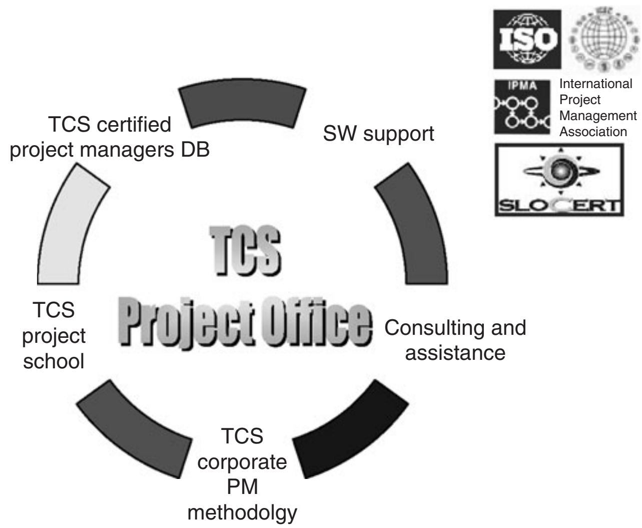

FIGURE 25.8 Functions of the TCS regional strategic project office.

JDP and CDP are usually supported by different extents of cluster project office services. Most of the clusters support their members by consulting, assisting, and training services. Figure 25.8 shows an example of cluster strategic office services offered by the TCS institution of collaboration support.

25.6 CONCLUSION

The current environment imposes the need for continual adjustment on organizations. Companies are confronted with constantly increasing competitiveness. One of the elementary reasons of increased competitiveness in the business environment is globalization. Mainly, the globalization processes impose on companies the requirement for analysis and reestimation of their strategic orientations as well as modes and forms of operating and activity. The form of company organization is also among the areas necessitating radical transformation. We can assert that modern organizations have to face the requirement for continual improvement of their mode or form of organization.

In globalization processes the SMEs (small- and medium-sized enterprises/companies) are particularly exposed. And for these companies it is more and more difficult to achieve competitive advantages due to a great need for concentration of particular types of resources. Formation of network structures appears as a possible solution for SMEs by achieving competitive capacity in the global business environment. Intercorporate integration based on a very loose and temporary pooling of the necessary resources at achievement of a certain competitive advantage is the principal characteristic of network connections.

Projects and project management are the primary tools for management of development and adjustment to changes in the business environment of a modern organization. Analyses of world trends show that mastering of projects and project management is becoming one of the key factors of success of any modern organization. Consequently, the linkage between set-up of network business connections and project approach is the most optimal solution. The project mode of work represents the fundamental form of functioning of network connections.

Clusters take a special position among network organizations. Integration and pooling of resources on the regional basis is a broad form of achieving the competitive capacity at integration of SMEs. In Slovenia, SMEs are predominant in the structure of organizations. Due to that, the support to integration of SMEs in achieving their global competitiveness is of significant importance for Slovenia. As it is evident from the presentation of experience in organization of clusters in Slovenia, the establishment of network connections between SMEs represents a proper response to difficulties at their achieving of global competitiveness.

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CHAPTER 26
PROJECT MANAGEMENT CERTIFICATION: FREQUENTLY ASKED QUESTIONS AND EXPERIENCES OF THE PROJECT MANAGEMENT COMMUNITY

Brigitte Schaden

Brigitte Schaden, actuary, graduated in business computer technology, and certified senior project manager, has been an international acting project manager for more than 20 years. She has been president and chairman of pma, the largest network-organization for project management in Austria, since 2003. In 1998, Brigitte became an active member of the International Project Management Association (council of delegates) and became vice president of IPMA in 2001. In 2006, she was reelected by an overwhelming vote of 100 percent for a second period in the IPMA-executive board. As vice president of IPMA, she is in particular responsible for certification and standards. From 2001 to 2004, she was also a member of the certification validation management board.

Brigitte Schaden has an excellent reputation as an assessor and coach, one of the services she offers as executive project management consultant by her own firm BSConsulting. She is regularly invited as a keynote speaker and panel member at professional meetings and congresses around the world.

26.1 INTRODUCTION: PROJECT MANAGEMENT CERTIFICATION

Project management is a science. You can learn it at schools and universities, and you can attend thousands of seminars and courses offered from different training or consulting companies. But project management is still not a profession. There is no trade association; project managers are "just" a community. Everybody is allowed to put "Project Manager" on a business card. Nobody knows whether this signifies a genuine professional project manager.

One can just blindly trust and try to work with any project manager, but practical experience shows that these kinds of selections are often very expensive and troublesome and result in less successful projects. So the idea of *project management certification* is that people have to prove their project management competences in various assessments. They get "certified," and companies and customers can be surer that these certified project managers know what to do in specific project situations. Furthermore, due to periodic recertification, there is also a guarantee that the certified project managers have maintained and developed these competences. Also, certified project managers have the opportunity to show their project management know-how and competence by an internationally recognized and appreciated certificate. This is of course an important competitive advantage.

Worldwide there exist different certification systems: AIPM, IPMA, PMAJ, PMI, PRINCE 2, and so forth. This chapter will not discuss all the different systems—the differences are often influenced by the culture of the country/continent and the time in which the certification system was developed and established—but this chapter will offer answers to the general questions: Why do people get certified? What is the benefit of certification? Does certification impact our daily business projects?

The bases for this chapter are the results of an online survey we did in October 2006 in Austria among the pma members—50 companies and 400 individuals (project managers, project owners, project team members, PM-Office managers, chairmen, HR-managers)—with a rate of return of remarkable 25 percent. There were also face-to-face interviews I conducted with executives of project-oriented companies in Austria and Germany. And of course there was my experience as chairman of Project Management Austria (pma), the largest network organization for project management in Austria; and experiences gained during international work as vice-president of the International Project Management Association (IPMA), the world's first and one of the leading international project management organizations. At IPMA, I am especially responsible for certification and standards. Developing these issues is crucial because certification and standards are important for the quality of project management and an important part for establishing and developing a good reputation for the "profession" of project manager.

26.2 FREQUENTLY ASKED QUESTIONS ABOUT PROJECT MANAGEMENT CERTIFICATION

Following are some of the common questions asked about project management certification:

- How important is project management certification in and for the international economy?
- How important is project management certification for the project management industry at the moment?
- How will this importance change in the future?

There is obviously greater understanding and status for the importance of highly professional project management and for the importance of well-skilled project managers. The reasons differ; there are more internal ones, such as quality assurance of the company project management competence, development toward a project-oriented company; or more external ones, such as requirements from the customers or requirements in bidding processes.

An internationally recognized and well-known certification gets therefore more and more important as a kind of standard and decision support. So it is not astonishing that there is a further rise in the certification market and a growing demand for certified project managers in all industrial areas of the world—and the world is really the whole world, all five continents included.

Worldwide there are more than 300,000 certified project managers with a high annual rate of increase. For example, in Austria the rate of increase was more than 20 percent per year in the last five years, and the prognoses are also similar for the next three to five years. Even five years ago certified project managers worked mainly in the telecommunication sector, in IT companies, and in plant construction. Nowadays, certified project managers are established in all industries. The increasing demand is noticeable, and project management know-how and experience are more and more required for many different jobs. It is an especially important asset for middle management career paths.

Project management know-how is also an asset for newcomers. Because of the increasing demand of basic project management know-how, in 2006 pma launched a new certification product: pm basic. It is mainly created for people with no project management experience—such as students or people who want to reintegrate themselves into employment. Currently, the demand for certified project management competence comes from international and major companies, but their influence has an impact on middle- and small-sized companies. More and more of the middle- and small-sized companies realize the benefit of certified project managers. In the near future, basic project management

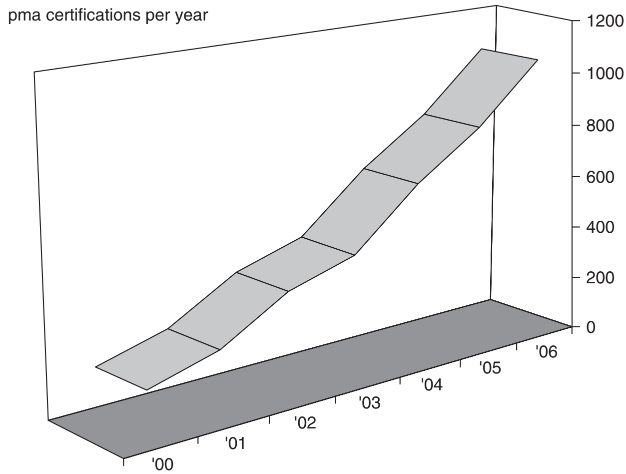

FIGURE 26.1 PM Certifications get more and more popular in Austria.

know-how will be as common as basic computer skills and basic knowledge in economy for employees and business leaders of all types and sizes of industries.

Unfortunately, the quota of women in the project management industry is unchanged; it's very low. The proportion of women to men in the project management certification field is approximately 30 to 70, but research shows gender-mixed teams are more successful. Efforts are underway to encourage more women to work in project management, but many more recruiting activities are necessary.

Observations already show that, especially for women, project management certifications provide a huge support in their project management career. Women who are project management certified are more self-confident and more likely to take an active role in project teams. The certification seems to reduce self-doubt. In general, irrespective of gender, research shows project management certification is an excellent motivational tool for employees.

As shown in the certification figures, both pma (Figure 26.1) and IPMA (Figure 26.2) are quite similar. The growth in the last two years is especially remarkable.

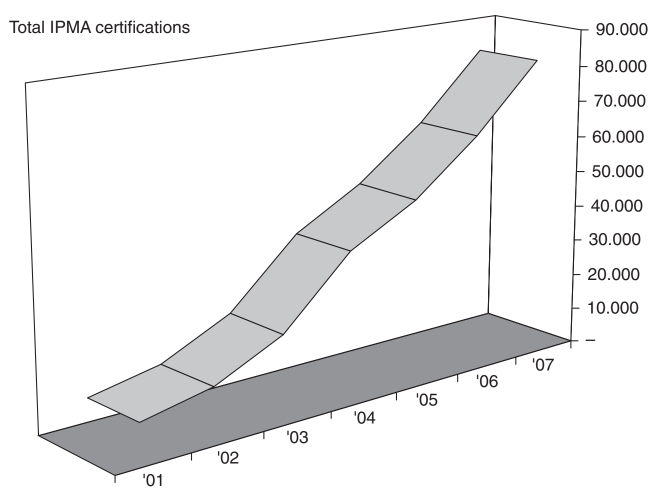

FIGURE 26.2 The worldwide growth of PM Certifications is remarkable.

26.3 GLOBALIZATION'S INFLUENCE ON PROJECT MANAGEMENT BUSINESS AND ITS AFFECT ON PROJECT MANAGEMENT CERTIFICATION MARKET

The project management industry benefits from globalization. There are more and more cross-border projects and more and more international teams. Therefore, expertise of project management methods (i.e., professional project management) is a key success factor for these types of projects. If these international, mostly strategically important and mainly high-risk projects are successful, it depends on the competences of the project managers. The general requirements for project managers working on international projects are increasing. The projects are more and more capital intensive; there is less and less time and more and more cross-culture competences, and soft skills are necessary to have even a chance to succeed.

Normally, the business language in projects is English, but that's not enough. It is important to have a corporate project management language. People should have similar understanding when using the same terms, even when they are working in different continents. Certification can be a guarantee of such a project management language, and similar project management understanding of other influences, independent of the country of origin of the project personnel, can also be recognized. For example, IPMA favored globalization, but with an open mind for a multicultural access; therefore, IPMA certifications always respect a regional influence.

Globalization in project management is an especially good opportunity for project managers from smaller countries to work globally and to be involved in projects of higher complexity. Research shows most companies prefer certified project managers for international projects, and project managers feel more accepted and well prepared for international projects with a project management certification.

According to Eva Stengel, Human Resources, Learning and Development, Management Development of Qimonda AG, "The Memory market requires very fast reactions due to changing customer requirements and the overall dynamic market development. For a global company like ours, time to market is one of our fundamental key success factors. A high project management standard and project management orientation is absolutely necessary to be able to execute fast and disciplined and thus ensure and improve our competitiveness."

26.4 FREQUENTLY ASKED QUESTIONS, II

Here are some more commonly asked questions about project management certification:

- Which know-how is necessary for the certification assessments?
- Is there a specific recommendation for education or training?
- How much experience as a project manager must be achieved for different certification levels?

The requirements for the several certification systems and the types of assessments differ. The basis for all certification systems is found in a special syllabus like the "ICB3,"—IPMA Competence Baseline," or, for example, methodologies like the "PMBOK Guide" or "Managing Successful Projects with PRINCE2." Some of the existing certification systems are more knowledge based, some more competence based; you can also find the wording "performance based" which is competence based: The project manager has the competence to choose the right methodology for a specific situation to get the best performance for the project.

One of the requirements for certification systems (see ISO 17024) is a strict separation between training and certification. It should be possible and preferable to go for certification without being forced to attend special preparation courses. Many companies offer their employees internal seminars and training courses helping to refresh the required knowledge.

Competences are also directly linked to experience, and that is why project managers have to prove their project experience if they decide to go for a specific certification level. A brief look at

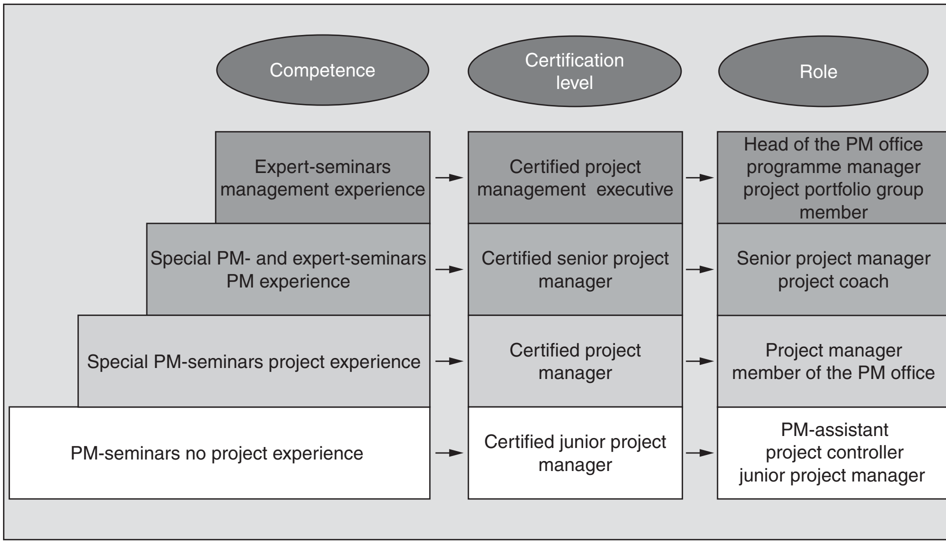

FIGURE 26.3 IPMA recommendation: certification-level linked to job-level.

the assessments shows that behavioral and contextual competences get more and more importance, compared with technical competences. Technical competences are simply a basis, definitely not enough to run successful projects. Assessing behavioral competences with special questions, role plays, or other adequate methods is also in demand. Often these assessments are the additional benefit for the candidates. AVL List GmbH: "Our philosophy is that the process of certification is more important than the certificate itself." (See Figure 26.3.)

26.5 PROJECT MANAGERS: CERTIFICATION AND PUBLIC IMAGE

Project manager is not a long-time established profession like doctor, advocate, or accountant. So it is more difficult to prove a specific standard of quality. There is no standard education; project managers come from different areas of business with different experiences and skills. Therefore, the public's perception of the job of a project manager is that it's something for "everybody with no special skills." And in business too often the title ends up defining somebody "with special skills, but not project management skills." Still, often the best specialist gets the mandate to direct the project, which leads to two weaknesses: The specialist has not enough time to bring in specialist know-how, and the specialist is often not an expert manager.

Certification can underline the tough skills necessary for this important business and can make the project management business more and more professional. And with a project management certification in hand, a lot of project managers get much more confident of their project management competence. This is a psychological effect with a great affect to the market.

Consider one more important issue: "a project manager is not just a project manager," because "a project is not just a project." There are smaller and bigger projects, more or less complex ones, more or less risky, more or less strategically important, more or less with multicultural influence, and so forth. Therefore, it is important to find the right project manager for the right project. When recruiting project managers, it is important to check and write down the requirements the adequate project manager must meet. The requirement of "a certified project manager" just as it is, is, unfortunately, common in project management recruiting, and it is not enough.

Many companies have developed a career path for their project managers. The different levels are linked to different types of projects, different salaries, and more and more, to different certification levels. The following examples show how various companies have responded to developing a career path for project managers.

Unisys in Austria has a career path in project management with four different levels; the highest one is for program managers or people responsible for the project portfolio of a customer. These levels are also linked to specific salaries.

AVL List GmbH already has a defined two-level career path but is working on a more mature model. At this point in time, there is no direct link to the salary, but this is also part of the currently developing career path.

BRZ has a clearly defined and valid career path. The projects are divided into four categories: small, medium, large, and special strategic projects. There are also four salary brackets: junior project manager, project manager, senior project manager, and project executive.

Qimonda does not have a specific project management career path. They have three official career paths (individual contributor, management career, technical ladder), and depending on function, project/program type and goals, they have project/program managers from all career paths. Each career path includes standard project management requirements due to project management training and experience for different project classes and functional requirements. The project classes and the certification levels fit together very well. And the different levels are seen as project management career steps.

If we look at project management as a profession, there must be a development in knowledge, experience, and most importantly, in social skills. That is also the reason why a project management certificate is not valid forever. After some years the project manager has to prove that he/she is still working as a project manager along with developing personal competences. The recertification will guarantee state-of-the-art project management competence.

Certification is an important step for a positive occupational image. Sixty-six percent of the polled project managers told us that the improvement of their personal value in the labor market was the reason for their certification. Thirty-six percent expect support of their project management career in their company.

26.6 REASONS FOR RECRUITING AND CERTIFYING PROJECT MANAGERS

The main reasons for companies or individuals to get certified are shown by the pma member survey (10/2006, see Figure 26.4):

- Ensuring a common standard
- Proof of project management competence by a neutral organization
- Ensuring a common project management language/concept
- Internationally recognized certificate
- Marketing benefit
- Requirements of the market (call for bids, customer requirements)
- Companies' regulation

Here is what some of those surveyed had to say about certification:

DI Wolfgang Gary, Operations Manager for Austria and CEE, Unisys Austria: "We trust in recognized certifications because we have had very good experience with certified project managers: The same project management understanding, the same project management language, the same project management standards—these are good guarantees for high quality and fast work. Furthermore, we are sure that the corporate standard of documentation protects resources and

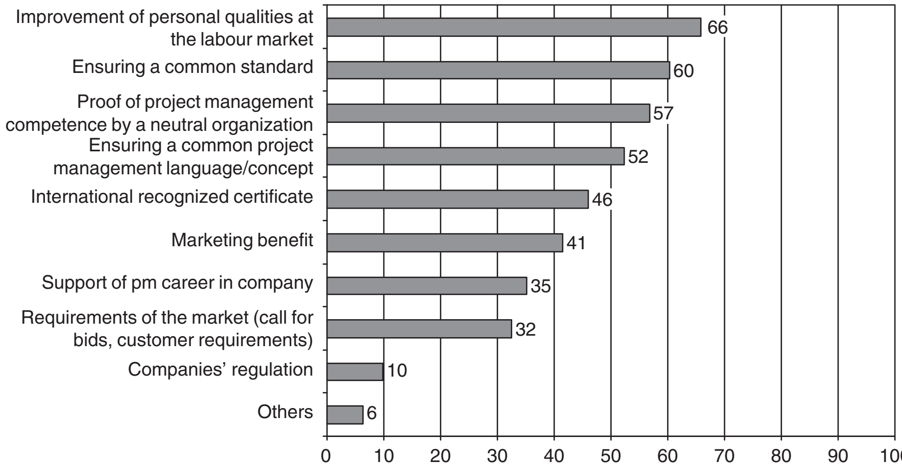

FIGURE 26.4 Various reasons for recruiting and certifying Project Managers.

important company know-how. It is ensured that the project is also ongoing in a perfect way during the absence of the project manager, for example, when he/she is on vacation."

Thomas Trebitsch, Skill Team Leader Project Management, AVL List GmbH, Headquarters: "Our intention was to uniform the know-how level within the company and to have an external and independent assessment about the qualification of our employees."

Günther Lauer, Head of eGovernment, BRZ: "On one side the certification process is part of the project management skill enrichment. The intention is to show project management skills and experience to our clients proven by an independent authority. On the other side, more and more invitations to bids for important projects expect (and claim) that the announced project will be handle by certified project manager or certified senior project manager, based on IPMA Level C and B respectively.

Eva Stengel, Qimonda AG: "In 2003 our CIO started the IT Project Management Quality Offensive within our Corporate IT Function. This initiative included all project management aspects: Implementation of a project/program office, review of the project management processes, project management training and certification concept, and an improvement of the project management culture within IT" (see Figure 26.5).

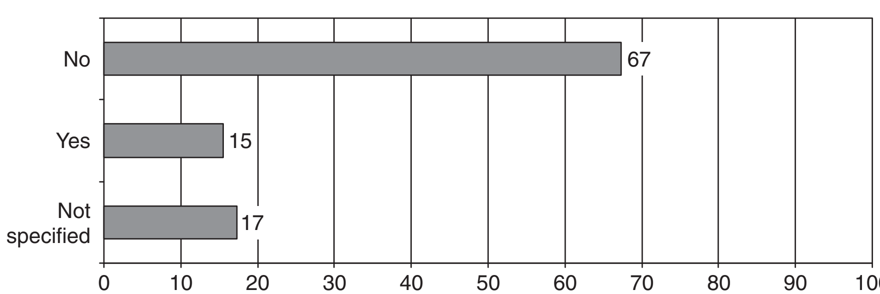

FIGURE 26.5 For 15 percent of the companies, a project management certification is a key point for recruiting.

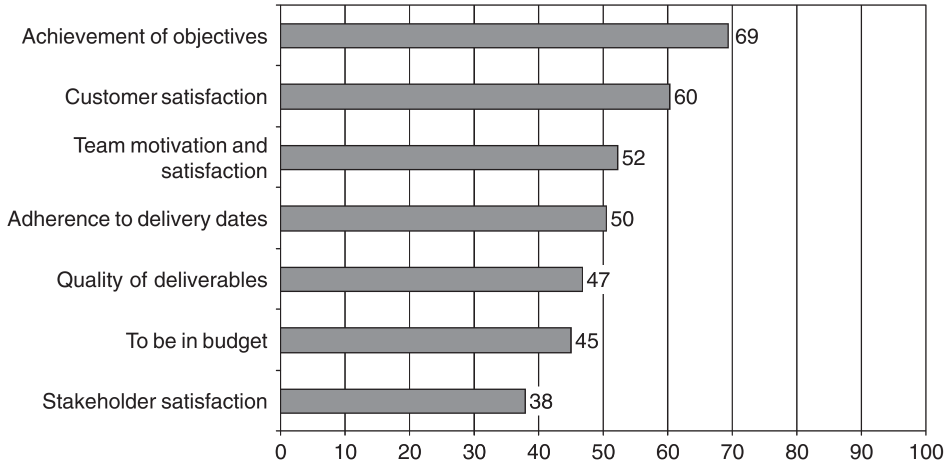

FIGURE 26.6 Various expectations and targets of improvement based on PM certification but on top: Achievement of objectives.

Project management certification is not a guarantee of a job, but for 15 percent of the companies, a project management certification is a key point for recruiting. Qimonda sees certification as a support for selecting new project managers. With the certification, you can expect specific project management knowledge and experience for the different levels.

What are the expectations and targets of improvements in projects based on project management certification? The following are the results of the pma survey (10/2006; see Figure 26.6):

- Achievement of objectives
- Customer satisfaction
- Team motivation and satisfaction
- Adherence to delivery dates
- Quality of deliverables
- To be in budget
- Stakeholder satisfaction

26.7 CORRELATION BETWEEN COMPANIES' AIMED IMPROVEMENTS AND CERTIFIED PROJECT MANAGEMENT PERSONNEL

The pma member survey (10/2006) shows these improvements have been achieved (see Figure 26.7):

- Achievement of objectives
- Customer satisfaction
- Team motivation and satisfaction
- Adherence to delivery dates
- Quality of deliverables

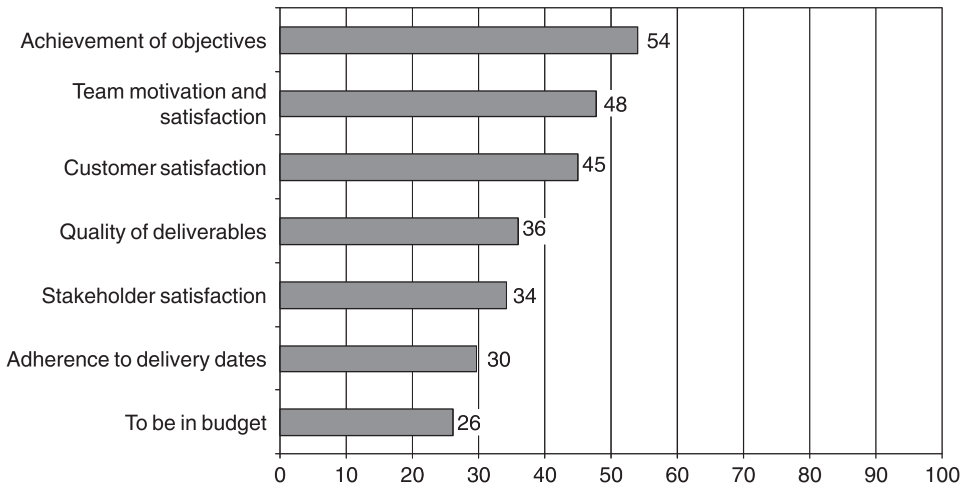

FIGURE 26.7 The improvements through PM certifications meet approximately the companies expectations.

- To be in budget
- Stakeholder satisfaction

These improvements meet approximately the companies' expectations.
Unisys noticed the following improvements:

- Common project management language
- More easy integration after project personnel changes
- Better understanding from customer's side
- Better connectivity when the personnel from the customer is also certified
- Achievement of objectives
- Quality of deliverables

AVL noted these improvements: "Tools and methodologies are more and more consistently used, the communication between the project managers has been improved, and there are less project failures due to bad project management. In general there is a better understanding of the project management standards."

BRZ mentioned that the whole certification process is a motivating challenge to their project managers, and influences the project management culture.

Qimonda observed the following improvements: "Our project management quality improved significantly after the Project Management Quality Offensive (including certification). The project management knowledge and some leadership topics are generally part of our training offerings, but the certified project managers run through voluntary learning loops because they want to pass the certification. Normally, they exert more effort on the project handbook, and that means the trained topics are really settled. The certification is a motivation factor and highly valued!"

In general, the estimation of the quality of projects run by certified project managers is high. Seventy-eight percent say that the quality is very good and good. In particular, the project contributors are satisfied (84%). This is also valid for Unisys Austria, although there is no possibility to find out any difference because all of their project managers are certified. The experience of BRZ is that every candidate for the certification raised his/her skills, so there is a direct impact on the quality of the projects (see Figure 26.8).

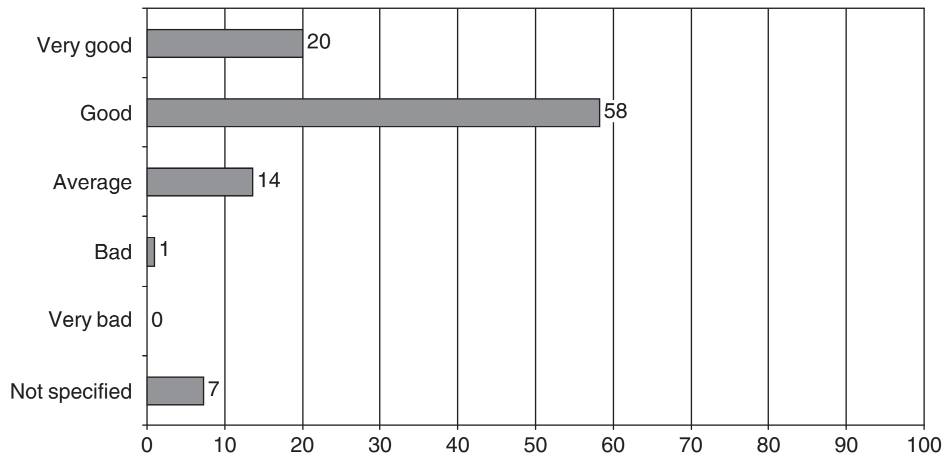

FIGURE 26.8 The quality of projects run by certified project managers is high and meets the expectations of the employers.

DI Wolfgang Gary, Unisys Austria, notes, "Unisys Austria is a project-oriented company. Most of our total revenue is achieved with projects together with and for customers. We have corporate project management standard, standardized forms, training programs for project managers, an implemented career path, and a project management office. This office is responsible for standards, process models, assignment processes, collecting and rating of projects, and for managing and providing all lessons learned coming out of projects and reviews. We had an international quality improvement initiative based on six sigma standard verifying with statistical methods that "rigid" project management (planning, controlling ...) has a positive influence on the quality of deliverables and the achievement of objectives. We believe that this fact is more guaranteeing with certified project managers."

Thomas Trebitsch, AVL List GmbH, Headquarters, states, "We are developing more and more to a project-oriented company. Up to now we do not have an official PM Office, but we have the skill team project management. And in this skill team, partly the functionality of a PM Office is located. Further activities are executed by the head of the project management skill team together with colleagues out of controlling."

According to Günther Lauer, BRZ, "We are well on our way to being a project-oriented company. For us the relevant criteria are to live the project culture and further develop it; common project management understanding in all areas and levels; clear definitions of project management roles, responsibilities, and tasks; development programs (trainings, network/feedback sessions, ...); a defined and valid career path for project managers linked to a certification system; portfolio management; a project management office and market comparison (including certification). Our project management office is responsible for all project relevant issues. These are project management culture development, project management marketing, portfolio management, project management forms, project management rules and guidelines, project management tools, and resource management for the project manager pool."

Eva Stengel, Qimonda AG, explained, "The relevant criteria for a project-oriented company are project management culture (project management is realized as important and necessary in the whole company); project management processes and key performance indicators are available and used; trainings are aligned to international standards and project management certifications are required. The responsibilities of our PM offices depend on the function, but generally they are responsible for processes, templates, and the actual project/program status."

26.8 ABBREVIATIONS AND ANNOTATIONS

AIPM:	Australian Institute of Project Management, www.aipm.com
AVL List GmbH:	The world's largest privately owned and independent company for the development of power train systems with internal combustion engines as well as instrumentation and test systems, www.avl.com.
BRZ:	Bundesrechenzentrum GmbH, Austrian Federal Computing Centre, www.brz.gv.at
IPMA:	International Project Management Association, www.ipma.ch
pma:	Projekt Management Austria, www.p-m-a.at
	pma survey, www.p-m-a.at
	online survey—carried out in October 2006 through pma (sample: pma members)
PMAJ:	Project Management Association of Japan, www.pmaj.or.jp
PMI:	Project Management Institute, www.pmi.org
PRINCE 2:	PRINCE2 is a Trade Mark of the Office of Government Commerce (U.K.), www.prince2.org.uk
Qimonda AG:	Former spun off memory product sector of Infineon, www.qimonda.de, www.infineon.com
Unisys Austria/CEE	Consulting and System Integration, www.unisys.at and www.unisys.com

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CHAPTER 27
THE CHIEF ARCHITECT AND THE ART OF PROJECT MANAGEMENT

David Holyoke

David Holyoke has a master's degree in Information and Telecommunications Systems from Johns Hopkins University. He is a Project Management Institute (PMI) certified project management professional (PMP). Mr. Holyoke has over 25 years experience in the software development industry and has served as a systems analyst, programmer, and software development project manager for a department-level federal agency. He managed a multimillion dollar software development contract, served as a program manager for a federal government-wide initiative, and supported the development of the agency's enterprise-wide systems architecture. He is currently a senior manager for Computer Sciences Corporation (CSC), serving as the chief applications architect on a major project for another large federal agency.

27.1 INTRODUCTION

One needs to only scan the classified ads to realize that the software development industry places a premium on system architects. The role of the chief architect, however, is often poorly understood. This chapter will not only define this role but will also describe how following an architectural approach to project management in general enriches final products and greatly improves the effectiveness of the project team.

Drawing parallels to the traditional role of architects in the construction industry may provide some insight into the role of a software systems architect and help clarify the architectural model for project management. In *ABC of Architecture,* James F. O'Gorman states that the architect "usually directs the building campaign. As designer, the architect gives shape to the client's needs and the builder's materials." O'Gorman discusses the need for the architect to ensure harmony between "function, structure and beauty . . . Each is discrete, yet all combine to shape a larger whole."[1] The drawing in Figure 27.1 illustrates O'Gorman's view of the elements that form the basis of architecture.

We see from the depiction that architecture includes equal parts function, structure, and beauty. A building, for example, must be structurally sound and must meet the tenant's basic needs. Once these basic needs are met, secondary, more aesthetic needs become very important. The building must be an attractive place to work or live. This is not to say that a warehouse must be a work of art. To be commercially viable, however, it must meet certain standards for appearance and have features that facilitate the work to be done. All successful projects, to some degree, have elements of function, structure, and beauty, and an architectural approach to project management seeks the optimal balance. We will use the software development industry as a case study to further develop this view.

O'Gorman's concepts are particularly applicable to the "construction" of computer systems. Indeed, as with the construction of buildings, structure, function, and beauty are all essential ingredients of software development. The need for function and structure is obvious; software must be

[1] University of Pennsylvania Press, 1998: 9–10.

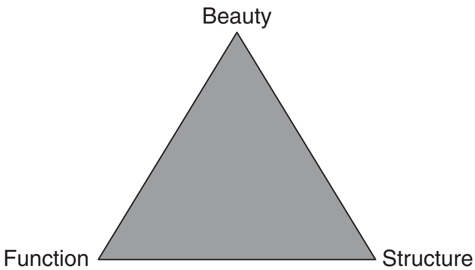

FIGURE 27.1 Elements of architecture.

both physically and functionally intact. As discussed above, the need for beauty may not be clear. If we make a distinction between basic and secondary needs, the need for beauty becomes more apparent. Most computer systems, for example, could accomplish their basic functions with monochromatic text (indeed, in the not-so-distant past this is exactly what they did). Yet huge sums of money are spent on colors, pictures, symbols, and other visual elements designed to please the eye. There must be valid business reasons for investing so heavily in aesthetics.

Attractive products are generally more successful than those that are purely functional, as any computer user old enough to have used Microsoft DOS can attest. Indeed, with the introduction of the graphical user interface (clickable icons, etc.) the home computer went from gadget to household need. The aesthetic touches are not only more pleasing to use, they do a better job of attracting our interest. Aesthetics are part of human nature, and all projects must give at least some thought to beauty.

In the role of "leader of the building effort," the chief architect must be concerned with all aspects of the new system. He or she must first develop a basic foundation or structure for the end product. He or she must also be adept at determining the client's needs, both in terms of *how* the system will work (function) and the system's *look-and-feel* (beauty). Unfortunately, chief architects are often recruited largely on the basis of their technical skills. This makes them ideal for working with "the builder" (i.e., systems engineers, programmers, etc.) but often not as skilled at developing the wants and needs of the client, or at bringing elegance and ergonomics to the design.

Likewise, typical systems architects may lack the ability to effectively convey to the business process owners (also referred to as *clients*, *users,* or *sponsors*) opportunities imparted by and limitations imposed by technology. The architect's role as liaison between the business and the technical staffs will be ineffective if he or she is too firmly entrenched in the technological world. Any project will benefit greatly from having a leader who is not only skilled in the appropriate technology but who also knows how to communicate with the project sponsor. This helps ensure that the outcome fulfills the client's basic needs *and* is something that the end user finds appealing.

The next section draws more parallels between the traditional role of the architect and those of the systems architect. The chapter then continues with examples from the author's experiences to help illustrate major concepts. These concepts are further developed through a review of architectural models systems architects use to organize their thoughts. Finally, the chapter gives a sample job description for a chief architect along with a summary for how to apply the architectural approach to other types of projects.

27.2 THE ESSENTIALS OF ARCHITECTURE

The basic purpose of traditional architecture is to *provide shelter.* Architecture would be relatively easy if design responsibility ended there; clearly, this is not the case. What distinguishes the architect from the engineer is the need to finely tailor the structure to the wants and needs of clients; even when clients don't fully understand their own wants and needs. While an engineer may possess the finely tuned skills for ensuring that the structure is practical and functional, it is in the capacity of the architect to ensure that the structure goes beyond the client's basic needs, addressing the desires.

The basic purpose of computer systems is to *store, manipulate,* and *present data* (images can be considered "visual data"). Systems architects must also tailor their products to the wants and needs of the clients. These products, the computer systems, transform facts (data) into information—something that helps the user make good decisions. The following list describes the role of the systems architect:

1. Understand what the user needs to know/decide.
2. Find out what raw data are available to support the decision-making process.
3. Figure out how to effectively transform the data into useful information.
4. Determine how best to interact with the user.

These steps are where the "art" of systems design emerges. To generalize these steps to other types of projects, most successful projects include the following major steps:

1. Determine the needs of the sponsor.
2. Determine the resources/raw materials available for the project.
3. Figure out how to meet the basic or primary needs of the sponsor.
4. Optimize the design, meeting as many secondary needs as possible within time and budget constraints.

These are all ideal tasks for project architects. The *chief* architect is responsible for bringing them all together. He or she might manage an architectural staff whose members specialize in specific architectural areas. The architectural areas relevant to software development projects are listed in the upcoming section: "A Model for Computer Systems Architecture." Systems architects often specialize in one or more of these areas, with the chief architect ensuring that all are working together as effectively as possible.

27.3 A MODEL FOR COMPUTER SYSTEMS ARCHITECTURE

It is widely accepted that there are four basic components of a computer systems architecture:

1. *Business Processes*—the basic functions the worker must carry out, independent of the tools or systems used to carry them out
2. The *Data* needed to support the business processes
3. The *Applications* (computer systems) needed to manipulate the data
4. The *Infrastructure* needed to support the applications

Table 27.1 discusses the questions the architect must answer when addressing each architectural area. Under ideal conditions, the architect first develops diagrams and descriptions of the *as-is* (existing) state for each of the areas. The architect then develops a plan for each area, also known as a *to-be* or *target* architecture.

It is important to recognize that each of the four areas described in Table 27.1 should be addressed by the architect serially. For example, the architect identifies how a user will interact with a system (i.e., applications issue) only after thoroughly analyzing the user's current work practices (business processes) and categorizing available data. The architect considers the volume of data, how information needs to be made available, and how long it needs to be retained before determining the "horsepower" needed to develop and support the software (infrastructure). Once each area is fully developed, the architect develops a transition plan for moving from the existing state to the target architecture. This may include a high-level project schedule.

Readers familiar with the data processing industry know that there is rarely enough time or budget to follow these stages strictly in an ideal way. Deadlines are often based on business needs rather than careful analysis of how long it will take to complete the work. The steps in Table 27.1 often end up being carried out concurrently, with some omitted entirely. An unfortunate result is that many

TABLE 27.1 Architectural Areas

Components of the Enterprise Architecture	
Architectural area	Description
Business Processes	How do the users currently do their work? How would they like to do it?
Data	What data relevant to the decision-making process is available? What data can/will the users enter into the system while they are using it?
Applications (software)	How does the data need to be manipulated to support effective decision making? What is the best way for the users to interact with the system?
Infrastructure	What development tools and hardware are needed to effectively support the applications? What will be the volume of data/transactions, and how quickly do the users need responses? Where are the sources of data?

software development efforts fail at tremendous costs. The only reason we accept this high failure rate is because the efforts that succeed provide so much benefit. Also, resourceful architects may be able to keep the project moving in the right direction despite extreme time or resource shortages.

The next sections go into more detail about how architects develop each architectural area. To better understand the sequence of events, we will begin with a discussion of the software development project life cycle.

27.4 THE SOFTWARE DEVELOPMENT LIFE CYCLE

All large projects can and should be broken into discrete phases to simplify planning and monitoring. To better explain how each of the architectural areas is developed, it is important to have an understanding of the software development phases, or the *life cycle.* Software development projects typically include the following seven phases, which may be carried out consecutively, iteratively, or combinations of both.

1. Analysis/Requirements
2. Design
3. Development
4. Testing
5. User acceptance or Validation
6. Training
7. Implementation

The traditional model of consecutive phases is shown in Figure 27.2. This consecutive or "waterfall" approach is often followed for larger projects. Iterative approaches are more common with small- to medium-sized projects, particularly with Internet applications.

When carrying out *Analysis*, the architect develops the "as-is" architectures and works to understand the wants and needs of the prospective user of the system. Understanding the requirements of the project sponsor is the most important step in any type of project. Failure here is guaranteed to doom the initiative, no matter how elegant the ultimate product. Mistakes made in the analysis/requirements phase are typically the most expensive to resolve since subsequent project

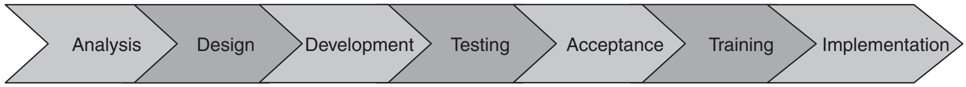

FIGURE 27.2 Steps in the software development process.

phases add to the work that must be undone/redone. Target architecture development begins in earnest only in the design phase. The architect may refine target architectures through much of the rest of the life cycle, using lessons learned from each phase.

27.5 THE FIRST STEP: BUSINESS PROCESS ARCHITECTURE

Development of the business process architecture generally takes place in the analysis and design phases. It outlines the steps that employees follow to produce a product or service. For information systems, the product or service might be to gather a set of facts necessary to make a decision or answer a question (e.g., can I tell the customer that his order will be filled?).

While developing the business process architecture, the architect may develop process flow diagrams to show how the business component conducts their business today and illustrate the sponsor's vision for how the process will be automated and/or changed. A typical business process diagram might look like the diagram shown in Figure 27.3, which is referred to as a *Swim Lane Diagram.*

The diagram shows who the participants in the process are (in this case, the customer, the sales representative, the warehouse, and the accounts receivable department), what decisions they must make (diamonds), and what actions they take (boxes). This diagram helps all project participants understand exactly what is being automated or changed.

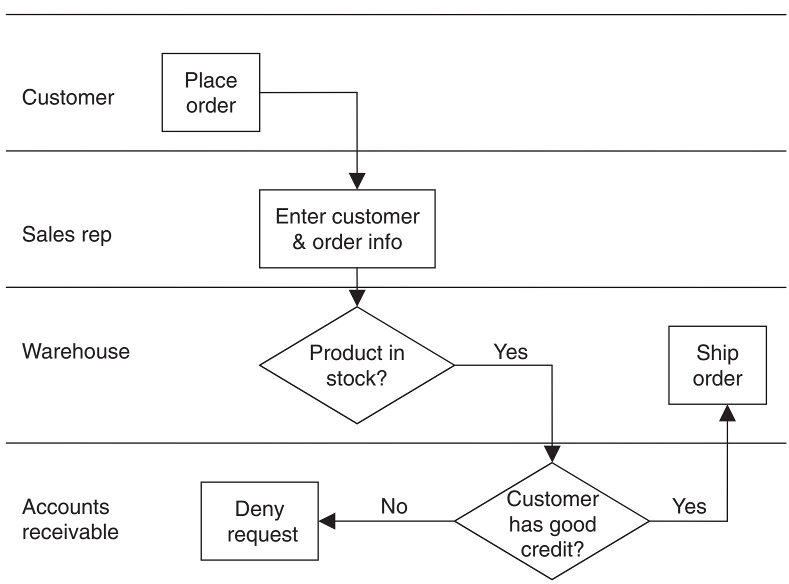

FIGURE 27.3 Simple business process model.

It may be helpful at this point to discuss the purpose and value of architectural diagrams. Diagrams, in general, are models of reality that help us better understand complex concepts. They simplify the world by focusing only on the elements critical to the decision(s) at hand. They take advantage of the visual centers of the brain, reinforcing and supporting the verbal elements of thinking and communication. Finally, models allow us to see what the outcome could be without the expense of actually building the product. Architectural diagrams are, first and foremost, communication tools. The first model that should be developed is the as-is business process model.

Developing the business process architecture can be a challenge. It is not unusual for a project sponsor or user representative to have a less-than-full understanding of the process to be automated. Many organizations are large and complex. The participants in the process may understand their piece but not understand how it fits in with the whole. This is the reason business process modelers are on the lookout for obsolete steps in the existing process, such as producing reports no one uses. Through the development of the diagrams, the architect helps the project sponsor fully sort through how things are done and how they could be improved. Gaps in the user's understanding are quickly exposed as the development of the diagrams progresses. Unfortunately, the step most often omitted in systems development efforts is thorough business process modeling.

The second most important function of the business process model is to communicate the basic goals of the project to the technical staff. It seems to be almost a truism that, when the subject deals with technology, those who are highly skilled in computer technology have a hard time communicating with those who are not. The minds of these two groups seem to be wired differently, and the technical expert who can effectively discuss computer-related issues with a business expert is rare. This is a key skill for a systems architect. The diagrams the architect produces are the documents that bridge the communication gap. The target business process architecture diagram captures the architect's and the sponsor's combined vision of the project, defining success in basic terms. Once the direction is set, the rest of the development team can get started.

27.6 A CASE STUDY IN DEVELOPING THE BUSINESS PROCESS ARCHITECTURE

Earlier discussion referred to the high failure rate for software development projects. Anyone who has worked in the industry for a significant amount of time has likely been involved in a failed project. To illustrate the importance of early development of business process architectures, we will discuss a recent failure at a large federal agency. The failure took place when the agency's software development staff came up with a simple solution to a big problem: getting timely reports of death to prevent subsequent payments to individuals no longer eligible for benefits (i.e., the decedent). Unfortunately, the staff waited until system design was well underway to develop the business process architecture.

The project was to develop an Internet-based death reporting system for funeral directors. Since the funeral directors were already reporting deaths using paper forms, an Internet-based system should get the reports in faster while making things easier for the funeral directors. At the very least, it would save postage, and the agency's field staff would no longer have to deal with paper forms.

The project leader knew early on that return on investment would be low since most death reports from funeral directors were already very timely, even with the paper process. The team would have to keep development costs extremely low to justify the effort. As design proceeded, they realized they had no easy way to "authenticate" funeral directors; they could not easily ensure that only authorized people would be using the system to report deaths. Using a manual registration process would be expensive, especially in terms of staff time. To justify this expense, they needed to predict how much use the system would get. This was when they began developing the as-is business process architecture. The study results were devastating to the project.

At the project leader's request, the software usability staff interviewed some funeral directors. They found that funeral parlors were typically either small, family-owned businesses, or larger, corporate organizations. The smaller operations were often behind the times in computer technology and many had either slow dial-up Internet connections or no Internet access at all. The larger operations made use of integrated funeral software packages that automatically completed the agency's death reporting forms. Using the new Internet application would be an extra expense for the small funeral parlors and an extra step for the large organizations. The project leader realized that, under these circumstances, usage rates would be extremely low. The executive staff accepted the team's recommendation to cancel the project.

Fortunately, the agency made this decision before software development had begun. Management considered the project a model for process success because the team made a wise decision early in the life of the project. The project squandered valuable design staff time, however, by not starting the business process analysis sooner.

The case study shows the importance of thoroughly developing the business process architecture in software development projects. For any type of project, the first step is for the architect to learn how things are done and to help the sponsor develop a vision for how they will be done when the project is complete. The architect uses business process or other models to educate the development staff and give them the high-level vision for the project. At this point the project work can get more detailed and more technical. For software development projects that finer level of detail is the *data architecture*, which is discussed in the next section.

27.7 MOVING TOWARD A MORE TECHNICAL VIEW: DATA ARCHITECTURE

In our age of information, the business of many organizations boils down to *data*. The Social Security Administration (SSA), for example, does not print or mail retirement checks. The Treasury and the U.S. Postal Service fulfill these roles. SSA successfully carries out its responsibility of keeping track of the annual earnings of hundreds of millions of current and former workers across the United States. When you consider that they started this in the late 1930s, you come to realize what an enormous amount of data SSA must manage. SSA also keeps track of the citizens' dates of birth and other vital statistics needed to determine eligibility for benefits. It determines how much to pay people and lets the Treasury know when to pay them. Without automated data processing, SSA would not be able to carry out its mission.

Like business architecture, data architecture may also be dealt with after the fact. This is because we tend to see the computer system (the application) as the focal point of automation. When the deadline is short, the tendency is to start writing code. But if you talk to any professional data administrator, they will tell you that data should be given very strong emphasis. Data administrators are often the computer professionals with the best connection to the business process owners. This is because the designs of their databases are significantly affected by how the data will be used. As a result, the data architecture may be the best thought-out part of the software development process. To understand data architecture, it is important to first get some background in how systems developers work with data.

Databases are organized collections of related data. They are divided into tables, which organize data at a lower, more detailed level. Tables have columns (also known as fields or elements) and rows (also referred to as records). Figure 27.4 illustrates these database concepts.

In Figure 27.4, there are two tables in the *Sales* database: C*ustomers* and *Products*. In the Customers table, there are columns for *Customer ID*, *Name*, *Address,* and *Phone Number*. Records are the complete set of data for one person or thing. In the example below, the record would be the customer ID, name, address, and phone number for one customer (e.g., Sam Smith). The products table is limited to data about the company's products: widgets, sprockets, and cogs.

The final step in developing the database is often building a table whose main purpose is to link two tables: in this case Customers and Products. The table in Figure 27.5 would be part of the Sales database and shows who bought specific products. It associates Customer IDs with lists of Product

Customer Table			
Customer ID	**Name**	**Address**	**Phone**
1234	Joe Jones	1234 Main Street Anywhere, IL 60025	410 999-1234
1235	Sam Smith	1235 Main Street Anywhere, IL 60025	410 999-1235
1236	Eileen Edwards	1236 Main Street Anywhere, IL 60025	410 999-1236

Product Table	
Product ID	**Name**
A-9876	Widget A
A-9875	Sprocket B
A-9874	Cog C

FIGURE 27.4 Sample database.

IDs for the products they purchased. A table like this might include other information about the purchases, such as the purchase date and number of units purchased. This way, customer information doesn't need to be captured every time the customer makes a purchase. It is stored in one place and associated with purchases through an identifier (in this case, Customer ID). This is referred to as *normalization* of data. We see that customer 1235 (Sam Smith) bought 600 units of Product A-9876 (Widget A) and 500 units of Product A-9874 (Cog C).

Once the data is organized into tables, the data architect can develop the two types of data models: logical and physical. These models show the makeup of the previously described tables and how these tables interrelate. The logical model depicts the seemingly ideal situation where specific facts (data elements) are stored in only one table. A logical model for our scenario is shown in Figure 27.6.

A logical model shows the relationships between tables. The lines between tables in Figure 27.6 show that records in the Sales and Customer tables are linked through the Customer ID, and the Product and Sales tables are linked via the Product ID. A logical model also shows keys that are combinations of elements within the record that uniquely identify the record (not shown in the example).

With the help of a good architect, the business process owner can look at the logical model and see how it relates to the business process. The logical model is a data-specific view of the way the business is organized. It also serves an important purpose of educating the development staff on the needs of the customer since it starts to translate the business functions into technical terms.

Sales Table			
Customer ID	Product ID	Date of Sale	Number of Units
1235	A-9876	11/14/2006	600
1235	A-9874	11/14/2006	500
1234	A-9876	10/13/2005	325
1236	A-9876	01/11/2006	75

FIGURE 27.5 A cross-referring table.

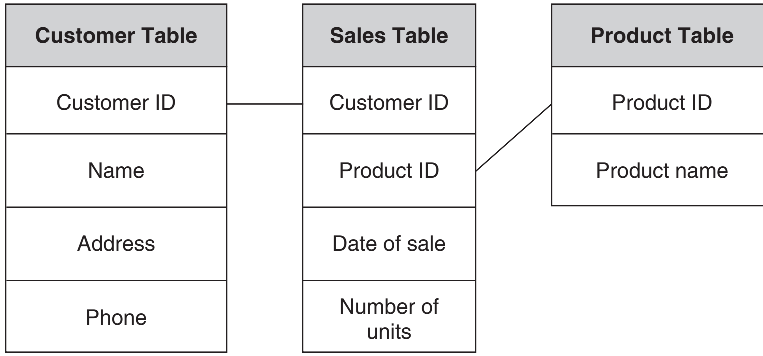

FIGURE 27.6 A logical data model.

Where the logical model is focused entirely on the business processes, the *physical* data model takes into consideration the needs of the software. It builds on the logical model, adding needed technical details. These details may be meaningless to the customer but are very important for the developer. For example, while it makes sense to store a data element such as *name* in only one table, the system may retrieve data faster if name is stored in several tables. There may also be a need to add indicators (flags and switches) to help the software keep track of what processing has taken place or what still needs to be done.

The logical model is the ideal design for the business process, and the physical model adapts the design to the needs of the software. Where the architect will probably have spent a great deal of time with the customer to develop the logical data architecture, they will be working primarily with software designers to come up with the physical model. The physical model is often refined throughout the project's development phase, and it is not unheard of to find problems in the testing process that require changes to the model.

The lessons for projects that do not involve data processing are twofold. First, it is important to break any project down into its most basic elements and develop these elements systematically. Organizing things into logical chunks makes it easier to develop the project and get the team organized. Second, it is important to take gradual steps in translating the requirements of the customer into a plan for the technicians. The vision of the architect must first be validated by the sponsor and understood by the developers. After that, the technical staff must be allowed to have input into the plan. The result needs to meet the requirements of both the customer and the people who will carry out the project.

With the completion of as-is and target data architectures, the architect has taken a big step in translating the customer's needs into information the developers can use to start building the system. The next step is to design the software.

27.8 BUILDING THE SYSTEM: APPLICATIONS ARCHITECTURE

Applications are the computer programs—the software. While there is certainly room for elegance in the architectural areas described above, the application is what the user sees. This is where the *art* of computer systems can best be expressed. If the applications architecture is being developed, the project should have reached a stage of maturity where the business needs are well defined and understood by the technical staff. The ultimate goal for the new system is well understood, and the necessary sources of data have been identified and modeled.

The architect is now a choreographer who will pull together disparate sources of data and come up with the best way to interact with system users, providing information in ways tailored to the users' needs. Timing is everything for a choreographer, and the same is true for the systems architect. The new system must provide information at the precise point in the business process where the decision needs to be made or the action needs to be taken.

Recall from the introduction that applications are tools for manipulating, storing, and presenting data. Many business applications consist of a series of programs that obtain data from multiple sources. The applications architecture is often developed using diagrams that describe the flow of data through the computer system. They include the major computer programs, files, and reports—all with names the business process owner will understand. These components will be linked together with arrows to show relationships and the flow of data. Each program will have inputs and outputs, which are often limited to file/table names. Information about the major programs will include whether they are online (user expects a response before logging off the system) or batch (a central computer will process the user's request later). See Figure 27.7 for a typical applications architecture diagram.

In the example, the software is called the *Sales Processing System*. The sales staff enters orders into the system, which accesses various tables (they may all be part of a single database). The system uses the Customer and Product tables to ensure the information entered by the sales representative is correct and that the order is acceptable. The arrow points from these tables to the Sales Processing System because data is flowing from the tables to the system (the system "reads" the data). Another arrow points to the Sales table because data is flowing to this table, recording the information about the sale (the system "writes" to the Sales table). Finally, the system produces an order for the shipping department.

This applications architecture diagram is the first point at which the architect can show the project sponsor and the technical staff the details of his or her vision for the new system. Under ideal conditions, requirements analysts will take the diagram and begin to develop all the details. This analysis will yield a precise set of instructions, sometimes referred to as *technical specifications* or *detailed functional requirements* for the programmers. In short, the application architecture diagram is the best tool for solidifying the game plan and getting the development team all headed in the same direction.

In addition to data flows, the architect may, at this point, be involved in developing standards and specifications. The "look and feel" of the software comes out in these documents and are products of the architect's eye for aesthetics. Grouping related information, highlighting important facts, maintaining consistency throughout the software, and making things "intuitive" all minimize the learning curve and help the user to be more effective.

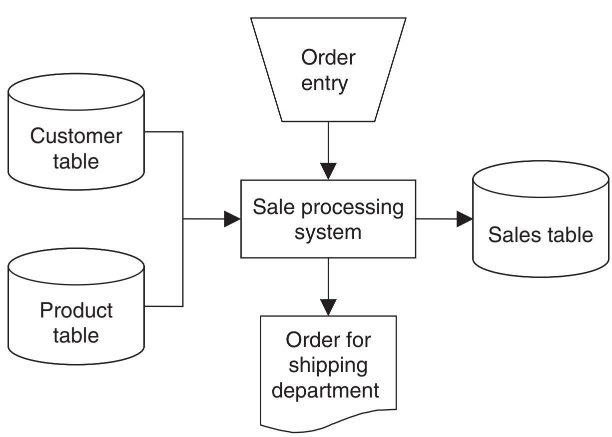

FIGURE 27.7 The applications architecture.

Without good architectural support, the development staff may have a very limited understanding of the environment in which the users must work. A software application designed for a hospital emergency room, for example, will be far different from a financial accounting system. A well-architecturally designed system will take these differences into account in the *ergonomics* of the system. The system for the emergency room might have less information on the screen, but it may make use of flashing text, highlighting, and bright colors to get people's attention in chaotic environments. The accounting system might focus on presenting a maximum amount of data on a screen, including acronyms and abbreviated column headers to save space.

As the application design and development progresses, the technical staff gains a fuller understanding of what demands the new system will place on the organization's computing infrastructure. These demands are accounted for in the infrastructure architecture, which is the subject of the next section.

27.9 KEEPING THE LIGHTS ON: INFRASTRUCTURE OR TECHNICAL ARCHITECTURE

The infrastructure is where the software operates. It may include computers of all sizes and types, from handheld devices to the largest mainframe computers. It may be limited to a single computer, or span a worldwide network. It may make use of the Internet, or be confined to a corporate Intranet (internal use only). It may range from simple database systems designed for single users, such as Microsoft Access, to multiuser systems capable of handling enormous amounts of data, such as IBM's DB2 product. The infrastructure must be appropriate to the requirements of the software.

Logically, the infrastructure is developed after the data and applications architectures are well defined. In the real world, the infrastructure is often predetermined, and the software must be developed to match the existing infrastructure. This can result in poor performance or solutions that are not well tailored to the needs of the users.

Infrastructure architecture diagrams typically show different types of computers, routers, and other hardware, along with depictions of how they communicate with or are connected to one another. They may be divided into logical models, which describe major functionality, and physical models, which are meaningful to network engineers. A typical infrastructure architecture diagram is highly technical and often has little or no meaning for the business stakeholders.

With the completion of the infrastructure architecture, the design is complete. The architect will typically stay involved, however, through the full life cycle to ensure that the client's dream becomes a reality.

27.10 SYSTEMS ARCHITECTURE: TYING IT ALL TOGETHER

To reiterate, computer systems often provide significant returns on investment in automating business processes. The processes which lend themselves best to computer automation are data intensive. Applications are the means to manipulate the data, turning raw data into useful information. The infrastructure houses these information systems. Architects develop as-is and to-be diagrams for each of these areas as communication tools. The diagrams serve the following purposes:

1. Help customers fully express their wants and needs
2. Help the architect express his or her vision to the customer
3. Help the technical staff understand the needs of the customer and the vision of the architect
4. Help ensure that the technical needs are considered in the design
5. Serve as project and system documentation

This systematic approach ensures that the ultimate solution is thorough, effective, and efficient. The person who leads this effort must be a skilled communicator. Strong technical and leadership skills are also vital. The following section will help the reader determine what to look for in a chief architect.

27.11 HELP WANTED: CHIEF ARCHITECT

Anyone who enjoys the orchestra will appreciate the project management skills of the conductor. Not only does he or she need the technical proficiency to know what and how each musician should be playing, the conductor needs to see beyond the notes the composer wrote and capture the true spirit of the music. He or she needs to know the personalities of the musicians and manage them so that they may together form a cohesive unit. The conductor has to know the wants of the listeners, putting on a show that pleases them. In addition to being part of the show, he or she has to keep all the musicians working together as a team during the performance, helping them to recover gracefully from errors. In short, the conductor is a technician, manager, marketer, public relations expert, performer, and leader. A chief architect must have a similar skill set. A typical job description is shown in Figure 27.8.

It should be clear to the reader that the chief architect must possess a very impressive skill set. For this reason, effective chief architects are hard to find and come at a premium. Similar skill sets are needed even for projects that do not involve software development. The next section discusses how the architectural management model applies well to other types of projects.

27.12 AN ARCHITECTURAL APPROACH FOR PROJECT MANAGEMENT

The benefits of an architectural approach to managing projects are well illuminated by home improvement projects. Typical homeowners have little or no experience running construction projects. They have a limited and very dear budget (the money, after all, is coming from one's own pocket!). The timeframe is very important since, at best the family is inconvenienced during the construction project, and at worst, they are homeless.

Architects are expensive, and formal architectural planning may be seen as an unnecessary extra step. Most builders will do an adequate job of fulfilling the basic need, such as adding extra living space. There are countless examples, however, of additions that *look* like additions. It is readily apparent that these projects didn't pay enough attention to the aesthetic requirements. Odds are that many of these projects do not do a stellar job of meeting the homeowner's basic needs either.

Home improvement efforts that followed a well-planned and implemented architectural design, however, do not look like something done after the fact. This is because the house not only meets the basic needs but also meets the ergonomic and aesthetic needs as well. Those new to the neighborhood believe the house was originally built that way. The project was a success because the architect took a systematic approach to developing the homeowner's requirements, tailored them to the existing structure (the as-is architecture), and effectively communicated the plans to the builder.

Regardless of the type of project, optimal results require an architectural approach. It is very important to include in any project team someone who is skilled not only at the technology but also at communicating with the project sponsor. Most projects are temporary endeavors, and most sponsors are experts in the business process, not in project management. They need the support of an architect to fully think through what they want and need, and to make these needs known to the development staff. Failure to accomplish this early in the project often results in changed requirements, or new requirements very late in the project. This is known as *scope creep* and is very hard on budget and schedule.

Projects also need someone who can keep the team focused on the big picture or ultimate goal. All too often, we either fail to adequately define what constitutes success, or we lose sight of our

SOFTWARE DEVELOPERS, INC. — CHIEF SYSTEMS ARCHITECT

The chief systems architect (CSA) serves as the lead technical representative during business process analysis and is responsible for high-level systems design. The CSA leads software development projects and directly supports business development, program staff, project managers, and software development groups to propose, design, and monitor the delivery and maintenance of effective and efficient technical solutions. The CSA is responsible for effectively integrating new technology with core capabilities. The CSA must be able to give executive-level briefings and solution demonstrations and prepare technical materials. The CSA is expected to maintain a high level of technical expertise. The CSA may be expected to propose changes in existing products or services that result in cost reductions or increased sales, write technical papers, give industry seminars, identify and champion new core capabilities or partnerships, and lead or mentor other technical staff.

The CSA must perform the following responsibilities:

- Act independently as a technical consultant and top level technical contributor for systems analysis and design during business process analysis
- Independently resolve complex issues
- Represent the Engineering organization with customers at the executive level
- Define system scope and objectives relative to a customer's requirements
- Participate in customer meetings and presentations to set expectations and to discuss customer responsibilities, requirements, initiatives, and concepts
- Provide technical guidance concerning the business implications of technical changes
- Investigate new initiatives and opportunities with respect to strategic goals
- Provide technical leadership in transition of solutions from proposal to implementation and operations
- Provide support and technical leadership to the project team
- Provide recommendations on the strategic use of emerging technology

REQUIREMENTS

- Bachelor's degree in Computer Science, Management Information Systems, or equivalent degree, master's or other advanced technical degree preferred
- Current certification as project management professional (PMP) by the Project Management Institute (PMI)
- Ten or more years of recent experience in information systems analysis and senior technology consulting
- Software development experience and knowledge of systems life cycle
- Ability to facilitate and lead work groups and to work productively with a wide range of people
- Excellent written and verbal communication skills

The successful candidate will have the following qualifications:

- ✓ Experience developing and implementing solutions involving the integration of multiple technologies/products, which may include custom software development
- ✓ Experience with Systems Engineering and/or Systems Integration
- ✓ Business development, proposal writing, statement of work development
- ✓ Demonstrated leadership and communication skills
- ✓ Client relationship management skills and experience
- ✓ Experience providing customer presentations and status briefings to management
- ✓ Demonstrated ability to develop and articulate solution concepts to customer and internal stakeholders and to translate from concepts into a solidified solution
- ✓ Demonstrated ability to understand customer business needs and recommend the appropriate technology and process solutions
- ✓ Demonstrated ability to facilitate and lead technical work groups involving multiple specialties in support of system solution development and implementation

FIGURE 27.8 Chief architect position description.

goals. Somewhere in the process the original, business-oriented goal of "Reduce average order processing time to three days" gets lost. It changes into something vague and self focused like, "Automate the order processing system." The staff focuses on technical issues and ends up doing a great job of automating an ineffective business process. The inevitable result: the new system is inherently flawed. This is known as *paving the cow path.* The architect needs to periodically ask the team, "Will this solution reduce order processing time?" The architect's creative and leadership skills provide the vision for how to develop a solution that will result in an effective superhighway instead of a meandering road.

27.13 CONCLUSION

The role of chief architect or its equivalent is critical to successful project management. All types of projects will benefit from a systematic approach, along with staff that is skilled not only in the technology but in communicating with the customer. The ability to create synergy is in the job description of the chief architect.

We saw in the introduction that architecture is the optimal balance between function, structure, and beauty. The chief architect must develop this balance, and the skill set is shown in Figure 27.9. The figure shows that the foundation for success as a chief architect is leadership. This leader must know the technology and be a skilled interpreter between the language of business and the language of technology. Finally, the chief architect must bring new, creative solutions to the design. The result will be a product that not only fulfills the client's basic needs but is also perceived as a thing of beauty.

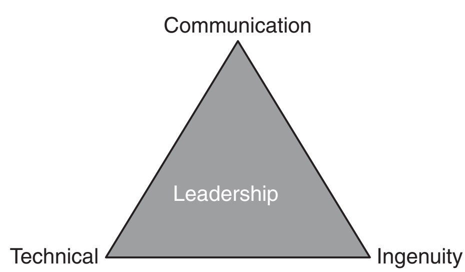

FIGURE 27.9 Skills of a project architect.

CHAPTER 28

THE TAO OF NIMBLE PROJECT MANAGEMENT: A REAL WORLD APPROACH

Donna Fitzgerald

Donna Fitzgerald is long-term practitioner of nimble project management. Over her 25-year career, she has specialized in helping companies improve the five Ps of product, project, program, process, and people management. She is the cofounder of the NewGrange Center for Project Management (a world-wide nonprofit Web-based organization) and of the Agile Project Leadership Network. She is a past board member for the American Society for the Advancement of Project Management (asapm), the author of over 60 articles on project and portfolio management and a frequent speaker at various conferences.

28.1 INTRODUCTION

In 1994, the Standish Group issued their first Chaos Report, which found that 84 percent of Information Technology (IT) projects measured were troubled in some way (either "challenged" or "failed"). The response from industry was significant. Everyone agreed something had to be done. Tighter controls and closer supervision were necessary, and an entire industry came into being to provide these solutions. In 2004, the Standish Group published new statistics. Project failure had dropped 13 percent in the intervening 10 years, but the percentage of projects deemed less than successful remained unchanged at 53 percent. While it's true according to the report that projects were overrunning their budgets by less money than in the past (56 percent as opposed to 180 percent) and were completing more quickly (overrunning by only 84 percent) the numbers still seem dismal. The question then is why, with billions of dollars and millions of man-hours committed to improving project performance, was there so little change?

Repetition without results brings stasis.
The superior PM encourages change in the people
and once again starts new growth.

While there is never a single answer to a complex problem, the most obvious answer could be that we're looking at the problem from the wrong perspective. At the same time that the Standish Group was publishing its findings in 1994 and the majority of people jumped on the heavy process and lots of controls bandwagon, a small group of people were exploring another approach. Rather than assume that things were predictable, and that it was possible to develop the perfect plan, this small group of people believed that life was messy, unpredictable, systemic, and that order existed only for a short time and in isolated patches. In 2001, 17 of these individuals came together and produced the

Agile Manifesto to explain their idea of a better way to write software, and in January of 2005 another group of 15 developed what has become known as the *Declaration of Interdependence for Agile Project Leadership*[1] in order to offer a hopefully better way to manage projects.

Some people mistakenly believe that agile is an ad hoc, loosey-goosy approach to a project. Those who practice agile project management know that it requires discipline, awareness, and a predisposition for action. Agile project management is probably best thought of as a discipline, rather like a marital art, than as just another project management method. For some organizations agile or *nimble* project management (my own flavor of agile) is just too much work. It requires always keeping your eye on the ball and being as proactive and vigilant about the rate that work is getting done (the project velocity) at the beginning of the project as most project teams are at the end.

To help reduce some of the difficulty organizations can face at the beginning of the project in the adoption of a more nimble approach, this chapter on the Tao of Nimble Project Management is offered in an attempt to paint a linguistic picture of both the actions and the mind-set that can be brought to bear on a project. A nimble project consists of five project management phases as shown in Figure 28.1.

This chapter will only discuss the actions that should occur during the Envision Phase and the Order Phase. Envision is a little different than a conventional project initiation phase since it concentrates on defining exactly what is being done (the who, the how, and the why) and then ensuring that everyone associated with the project understands the same thing. The Order Phase replaces some of the work normally done in a planning phase, but this chapter will just be concentrating on how a project manager (PM) can create an initial area of order so that he or she can even have a hope of making a plan that won't fall apart two minutes after it's made.

The approach in this chapter is to create a visual image (Figures 28.1–28.12) that highlights the concepts you should be dealing with at each step of the journey. Also included are multiple lists of questions to ask yourself along the way (usually in sets of five). To keep all of this in perspective, all of these are suggestions that can be implemented within just a few meetings or in the odd hour snatched here or there. Some of the actions you will need to take as a result of asking all of these questions might take more than an hour, but thinking through the problems is just a matter of counting the questions off on one hand. Once the discipline of nimbleness is acquired, the steps outlined here fade into the background, leaving you free to put 100 percent of your attention on the issue you are facing on your project at that exact moment in time.

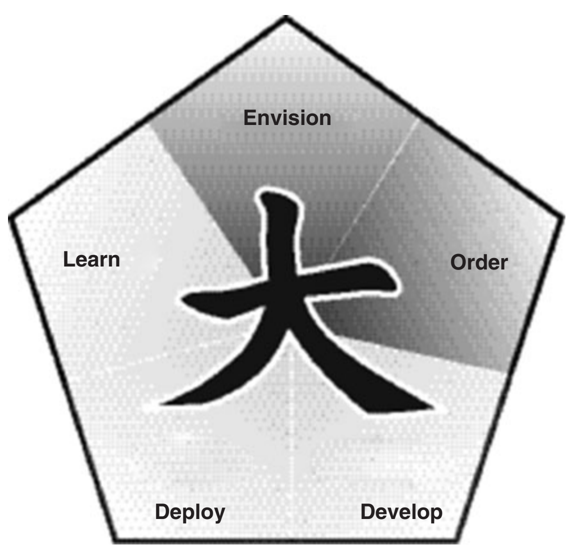

FIGURE 28.1 The five project management phases.

28.2 PHASE 1 ENVISIONING THE END RESULT

Clarity of vision brings with it a favorable wind;
experience, knowledge, and action flow effortlessly together,
sustaining the project as it moves forward.

Much of the conventional wisdom about projects says that if you are the PM, someone else has picked out your destination and your route, and it's simply your job to drive the car. While there is worth and value in being a good Second Lieutenant who carries out the Captain's orders, the nimble PM holds that a job can be done better and more completely if all members understand the goal and can make their own decisions where necessary rather than always looking outside of themselves for direction.

In order to provide that direction I recommend translating your marching orders into what I call a "North Star vision." A well-crafted North Star vision should be easy to remember and worded clearly enough to provide guidance late at night when a decision needs to be made and everyone is too tired to think.

28.3 CREATING THE NORTH STAR VISION

Assuming the initial vision hasn't been packaged and neatly handed to you with a bow on top, your first job will be to take everyone's opinions and inputs and work out a succinct statement that answers all of the traditional who, what, where, when, and why questions. The classic vision statement in my mind has always been that of President John F. Kennedy when he set the United States on the course of a successful round trip flight to the Moon with the words: "I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the Earth" (May 25, 1961).

If we map the above quote against the who, what, why, where, and when model shown in Figure 28.2, we'll see that as effective as this vision statement was for its time, Kennedy's explanation of why we should go to the moon was little better than an implied "because I said so."

FIGURE 28.2 The North Star vision.

In September of 1962, Kennedy elaborated on the "why" in a speech he gave at Rice University. If *technical leadership* is now inserted as the predominate "why" that he offered, we now get a well-formed vision statement: "I believe that this nation *(who)* should commit to achieving the goal of [technical leadership] *(why)*, before this decade is out *(when),* of landing a man on the moon *(where)* and returning him safely to the Earth" *(what).* Kennedy's vision, as understood by the nation, was complete and compelling (1962).

One comment sometimes heard from project teams is that *where* simply doesn't pertain to them. For example, an internally focused project done for a company with only one location might be considered to have an implicit *where*. While you could substitute something like how for the where;. specifying the *how* in the vision statement could limit your options later in the project by having specified something you might need to change.

The next question usually asked is whether or not a vision needs to be realistic. Dr. Adam E. Nair of The Hebrew University in Jerusalem, and Dr. Ronit Bogler of the Open University of Israel have researched visioning and found that a goal incongruent with reality is actively destructive to an organization since it results in people losing faith in the leadership of the company or, in our case, the project.

That doesn't mean a goal can't be an enormous reach. When Kennedy kicked off the space program in 1961, absolutely no one was sure how the goal of landing a man on the moon and returning him safely was going to be accomplished. The technology didn't exist at that time, and there wasn't any free sharing of information with the Russians who were the leaders in the field at the time. What America did have was *will* and a deep-seated belief in Yankee ingenuity. A good North Star vision generates energy and supports creativity by inspiring people and giving them permission to perform at their full capabilities.

One thing to remember about crafting a vision statement is that you might not get it quite right your first attempt and that doesn't matter—vision can be refined . After all, Kennedy, with a team of speech writers at his disposal, didn't get it quite right the first time but successive discussions clarified the vision and inspire the nation to one of its most focused efforts ever undertaken outside of a war effort.

Even if you are only translating explicit instructions given to you by someone else, creating a situation where there is agreement on direction and wording can make getting to the end a much easier and more successful process for all concerned. Creating the North Star vision statement is a perfect exercise to include at the extended team kick-off meeting and should only take between 30 minutes and an hour and a half at most—if there are lots of nuances that need to be clarified in the project.

28.4 VALUE CUBE

Value doesn't lie in visible and conspicuous things.
Value lies in less toil for the harvest.
Value lies in more knowledge from fewer words.

The next step in communicating your direction will be focused on your project's value. It is closely related to your vision statement. Within a nimble project management schema, value surrounds vision like a "cloud of possibilities." Value is always multifaceted: it can be measured in a number of ways. Value can be measured objectively by the dollars the company is willing to spend on the project. The number and quality of people assigned to the project represent its value over and above the dollars apportioned to it. Finally, the project's perceived value is defined by how much it will improve the lives of its intended recipients once it is completed.

The project value is also open to a more subjective frame of reference. Project teams often value a project by whether or not the underlying technology used to develop the solution is interesting or state of the art and whether or not the solution itself is elegant. Given the multitude of definitions for project value, how is value best represented? Returning to the example of President Kennedy's space program, agreement on a value statement was a thorny subject. The scientists wanted basic research as a goal, whereas the politicians wanted something to use to compete with the Russians and restore the country's self-image. James Webb and Robert McNamara ended up hitting upon the core value statement in a memo they sent to the president recommending changes in the space program:

> It is man, not mere machines, in space that captures the imagination of the world. However small its value in military or scientific terms, such a project would not only recover the country's lost prestige, it would stimulate advances in every phase of space technology and give the nation the means to explore space in whatever way best suited the circumstances[2] (1961).

While Webb and McNamara's memo communicates much of the core value of the space program, it requires a careful reading and some thought to be sure there are no translation errors between it and the actual list of tasks that might be derived from it. A suggestion to simplify the problem is developing a value cube instead of a singular value statement. The concept behind the value cube is simple. The top and bottom of the cube are defined by the dollars and amount of time the sponsors have agreed to commit to the project. The other four sides are broken down according to the perceived value to the different stakeholder groups. For example, (1) value to the sponsor, (2) value to the team, (3) value to the primary stakeholders, and (4) value to the other stakeholders/customers (see Figure 28.3).

Placing these six elements figuratively on a cube instead of just in a list helps to visually reinforce the fact that while all six factors need to be addressed to make sure the project works as a whole, each of these factors also exist in a state of stubborn isolation from all the other factors. For example, the sponsor might want the project to be successful because the sponsor's bonus is dependent on it; the end customer might want the system to be successful because it would increase product availability (not caring in the least if the sponsor gets a bonus), and the project team might want to have the project be successful because it will prove out the efficacy of the new state-of-the-art toolset they are using on the project.

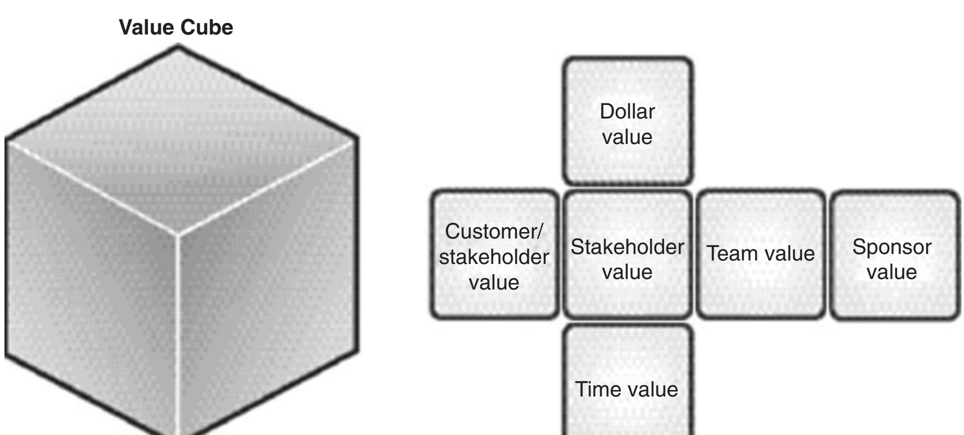

FIGURE 28.3 The value cube.

28.5 PHASE 2: CREATING AN INITIAL AREA OF ORDER

Remember that what you are looking at is a small piece of the whole.
Remember that the few are still part of the many.
Do the difficult immediately, and the total effort will be small.

Having agreed on the vision of the future that everyone is committed to working towards, and having agreed on the value that should be delivered at the end, the next step is to assess the the figurative landscape that will need to be traversed on the journey forward. In conventional methods this is often referred to as *planning,* but in nimble project management it is called *creating an initial area of order.* The basic premise is that in any project situation some things can be changed, some things have to be accepted exactly as they are, and some things can be nudged, pulled, or pushed into shape if approached correctly. Wisdom of course lies in understanding what's what.

28.5.1 The Project Environment

In the last several years, there's been general agreement in the project management community that we've outgrown the triple constraint. A real project environment has some things that won't change in the short term, some things you might be able to influence but not radically change, and other things that are completely under your own control as a project manager.

As shown in Figure 28.4, there are four factors that serve as boundaries for the complex adaptive system known as a project. These factors are (1) stakeholder and sponsor expectations, (2) market conditions/regulatory requirements, (3) the state of technology, and (4) the company culture.

There are also factors that define how much flexibility we have within the boundaries established in the first four factors. In complex adaptive systems theory, systems such as projects are

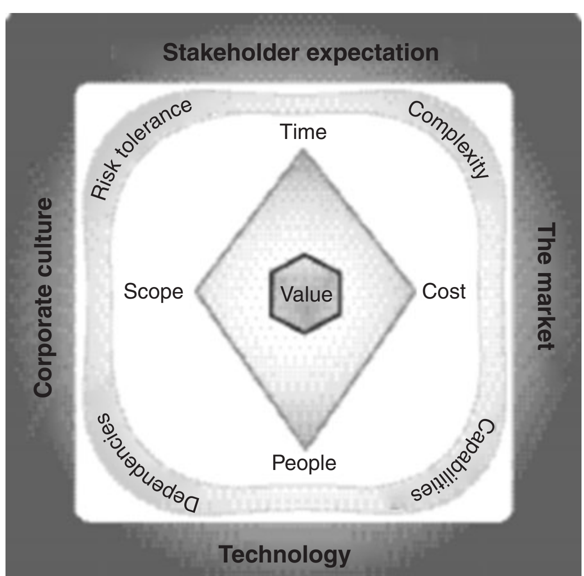

FIGURE 28.4 The project environment.

assumed to balance on the edge of chaos—too much stability and nothing ever gets done; too much chaos and everything spins out of control. Within the confines of the boundary conditions there are four edge factors: (1) risk tolerance, (2) complexity, (3) capabilities, and (4) dependencies.

Just like a rubber band there is only so much stretch in an edge factor. You can shape them to a limited extent to fit some of your short-term requirements, but just like a rubber band, they'll snap back to their original shape at the first possible opportunity.

Moving inward on Figure 28.4, we now see the project diamond. As stated earlier, most project management literature has begun to expand the triple constraint to include other equally important factors, such as quality, or customer satisfaction. The project diamond shows this influence by treating people as different from cost and uses the value cube defined in the envision phase in place of the common addition of customer service. The rest of this chapter will focus on reviewing these 12 factors in more depth.

28.5.2 Project Boundaries

The key thing to understand about project boundaries is that these fixed factors should be considered essentially unchangeable for the length of the project. They define the project's environment at its inception. If any of these factors change significantly during the project, then there is a significant possibility that the project has become obsolete: it should immediately be postponed or cancelled. According to the Tao of Nimble PM there are very few things that can ever be stated as absolutes, but the project boundaries have to be regarded as fixed since they define the environment of your project.

28.5.3 Stakeholders and Sponsors

The People want many things individually,
but they will accept less if all benefit.
A true leader acknowledges the former and delivers the latter.

Saying you should treat your stakeholders and sponsors as fixed is an interesting statement, but what does it mean in practice? Most literature on the subject of dealing with stakeholders and sponsors stresses communication and involvement. While these are extremely important concepts, they come later in the process. During the period of time when you are establishing your initial area of order, the sole concern is to understand the attitudes, hopes, and desires of the people for whom you will be doing the project.

To avoid any confusion over wording, I've taken to calling these *key acceptance conditions*. There will never be a fixed list of these conditions. Political reality ebbs and flows with the same regularity of the tide; what's important today will be of little consequence tomorrow, but *something is always important*. Acceptance conditions are the political realities surrounding the project. They are those things that your stakeholders and sponsors hold as important and that you need to respect. They are also, to be blunt, all the backs you'll need to scratch in order to even have a hope of completing your project successfully.

Dealing with political sensitivities and political realities is difficult for many PMs. While writing this chapter a high-volume discussion has been happening at the NewGrange list server on just this topic. From this discussion it was clear that for many PMs all politics equal lying and are therefore bad. Suggesting to these PMs (as some did on the list server) that they need to take political realities into consideration on their project was a message few of them wanted to hear. The general feeling was that even one moment spent on how to ensure the project finished on time just so the executive vice president could earn his large, year-end bonus was just *wrong*.

The Tao of Nimble PM tells us that good PMs can and do routinely operate in an environment colored in shades of gray. They can articulate when something is good for the company (value) and when it's politically expedient (good for the project), and they know how to balance the two so that there is benefit for all.

Beyond sheer political considerations, the next step is to understand why this project is necessary from the point of view of all the interested parties. Some sample questions to consider about your project include the following:

1. Why do the stakeholders want this project now?
2. Why do they think that the problem they've identified is really the problem?
3. What else is happening in their environment that might make this a bad time to solve the problem?
4. If this project is successful, who will be affected outside of the core group requesting this project?

These questions should be asked from the perspective of each class of stakeholder associated with the project as shown in Figure 28.5.

Asking these questions often makes PMs very nervous. After all, there seems to be a belief that once we've been given a project, then it is ours to "do or die and not to reason why." The Tao of Nimble PM takes a different perspective. Even if we accept our project as something akin to a "Mission Impossible" assignment, it is good to know from the outset where our highest risk factors might lie and how they could affect the lifespan of our project.

28.5.4 The Market or Regulatory Requirements

Project teams often forget to take into account the general market forces affecting the organization paying for the project. Then they wonder what hit them when the budget gets cut or the deadlines move up or move out. Since market factors are risks that can't be addressed by actions of the project team, they are often disregarded. It's important to understand at the beginning of the project if the market just started expanding. In this case, the speed with which you can deliver any solution might be the important factor today, even if number of features had been the major goal in the past. Or has the market recently turned down? Cost might be the factor, or it might still be speed if the goal is to stop wasting money on the problem your project is designed to fix.

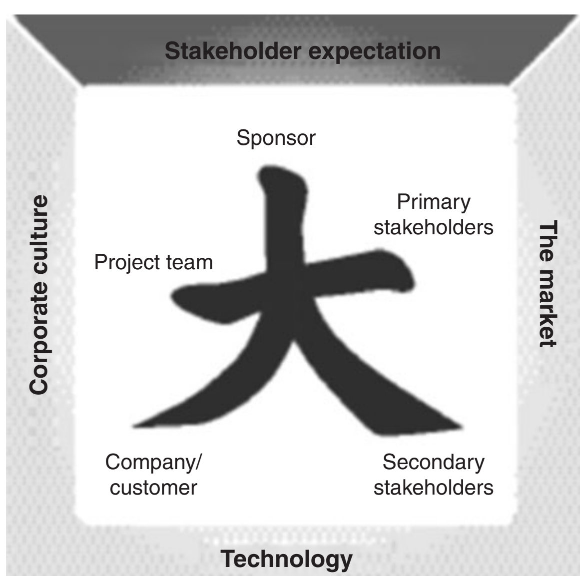

FIGURE 28.5 Stakeholder expectation.

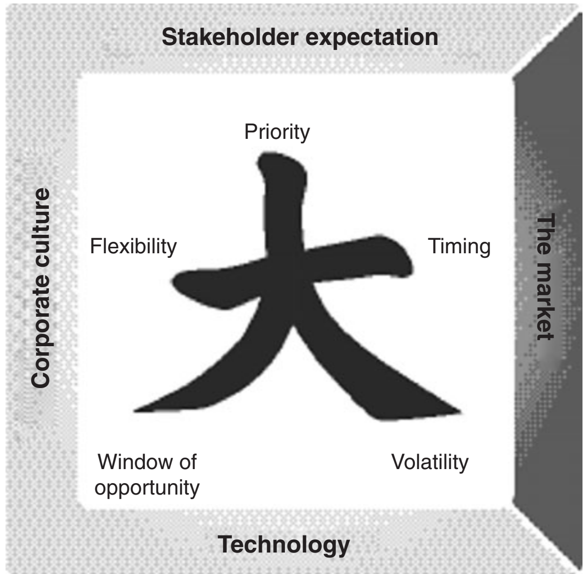

FIGURE 28.6 The market.

Another benefit that comes from understanding the marketplace is that it improves your personal sense of timing. Good projects done at the wrong time fail just as certainly as bad projects. While companies with good portfolio management processes might do real option analysis on all proposed projects, if it hasn't been done on yours, you should do a light version of it yourself.

The concepts highlighted in Figure 28.6 can all be used as a short hand way of examining your project to determine how ordered (or stable) it is both now and in the immediate future.

There are five questions that can be asked to better help you understand each of the concepts called out in the figure above

1. *Why is this project being done now? (Priority)* Because of the budgeting process in most companies, projects are often requested when it seems feasible to get funding rather than when they are necessary for the organization. Very often a group of projects that should be done sequentially are all asked for at the same time, or multiple projects with overlapping requirements are requested on the premise that at least on of the projects will get approved. As the PM you need to know the business drivers underlying the project.

2. *How volatile are the conditions surrounding the project? (Volatility)* Trying to time a product for a known market is one thing; trying to catch a narrow market window for something that might prove a fad is another. This factor is totally subjective. If the market window appears very small, then anything that delays or extends the project is fatal.

3. *What will be the impact of doing this project later? (Timing)* The results of asking this question are often surprising. Sometimes there's a sigh of relief that accompanies the answer of "well if we do it later then project A could finish or we will know more about the new technology we want to use or we actually think it will cost less" From the other side the answer might be "We have to do it now because we'll miss a market window or project Z (which everyone is so anxious to do" can't really be done until we finish this project and build out the infrastructure."

4. *At what point in the future would it no longer make sense to do this project? (Window of Opportunity)* This is a classic question in the formulation of real options. When combined with the answer to question 3, you will completely understand how the project in question is positioned in time relative to everything else that is going on around it.

5. *Can this project be broken down into phases or iterations? (Flexibility)* Both the project itself and the work being done on the project might be accomplished in smaller chunks in order to allow for better fine-tuning with market changes.

28.5.5 Technology

> **Too much data is like a loud noise.**
> **Listening below the noise brings information;**
> **understanding that information provides wisdom.**

The next factor to consider is technology. Are you doing a project five months before the next major release of software from your vendor of choice? Is the whole market in some sort of flux, leaving you at risk of picking a technology that will make you somehow incompatible with your clients? Are you thinking of developing on a technology so unique that you will have trouble keeping staff who are able to support it?

This last factor ends up impacting the ultimate success of projects all too frequently. One project I managed for a very large bank was based on "end user maintainable" proprietary software. What that meant was that people needed to be sent to four weeks of training and then—and *only* then—would they be able to maintain/enhance the application. The situation proved rather untenable for the company since it required reinvesting in training every time a trained resource left, which was unfortunately all to frequent since the individuals working on the system felt they were spending too much of their lives cultivating a nontransferable skill.

Another factor to consider is the inextricable link between technology and the marketplace. I once helped a client with a project where I recommended that we build on the current technology and ship the product as rapidly as possible. I knew that the market was unstable and that the path to survival was to establish a beachhead and then adjust to whatever came next. The client, who was a technologist at heart, felt that it was fine to slow the project down and wait for the promise of a better technology to catch up. The product shipped a year past its original due date into a flat market and made very little penetration. The issue wasn't which one of us was right about technology—the issue in this case was that the technology issues, though very real, were secondary to the marketplace issues.

The concepts highlighted in Figure 28.7 can all be used as a short hand way of examining the role of technology your project.

There are five questions that can be asked to help understand the concepts related to technology. They are:

1. *How mature is the technology your project will be using? (Maturity)* While it's conventional wisdom to avoid version one of a software offering, it makes equal sense to examine the decision to develop or to continue enhancing a technology that is becoming obsolete.

2. *Is there a new release coming or a standard that isn't finalized yet that might affect your project? (Timing)* There is no right answer with this factor. I have had projects where it made sense to stay on the current release even though the new release would be out mid-project. I have also had projects where the cost of the technology was expected to fall in the future, which meant waiting would allow the project to more closely match the hoped for return on investment (ROI.)

3. *Is this technology consistent with the company enterprise architecture and application plan? (Standardization)* If the answer is no, just make sure there's a very good reason why it isn't.

4. *Does the planned technology fit your project? (Compatibility)* Anything that looks different or behaves differently than what your end customer is used to will need to be addressed at some point in the project. At the beginning of this article, I mentioned that 53 percent of all projects end up being troubled in some way. One of the reasons is lack of compatibility between the technology and

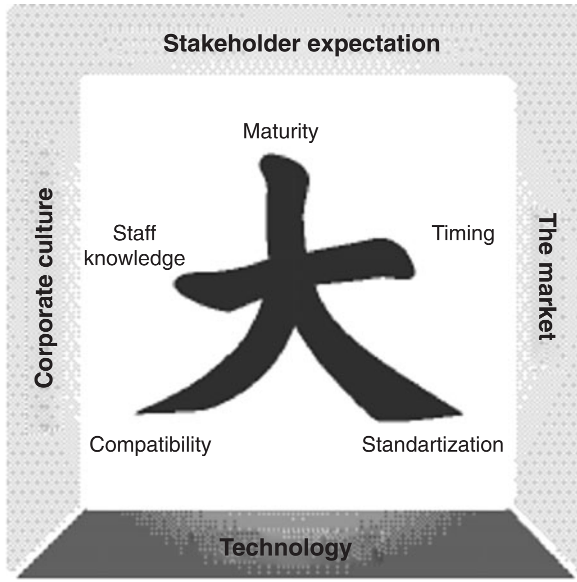

FIGURE 28.7 Technology.

the end user. Years ago, I remember sitting in a staff meeting where we decided to move from one operating system to another on the mainframe. The decision was open and shut from the technology standpoint; the new system was more powerful and supported lots more functionality. The problem was that the new operating system was as user *unfriendly* as a system could be. By replacing the operating system, things that users had been able to do themselves would now become impossible, which would create an immediate need to solve the new problem the new technology caused. Again, your goal in asking this question isn't to come up with a simple yes or no answer; it is to uncover hidden consequences of the decisions you are about to make.

5. *How well is the technology understood by your current staff, or how interested are they in learning it? (Staff Knowledge).* Good technical folks want to keep their skills cutting edge. On the other hand, as attractive as Ruby on Rails (open source) might be to some of your developers, adopting SharePoint (from Microsoft) as your Web development framework of choice might make more sense.

In the final analysis, a PM always needs to be sensitive to the current and future state of technology. Sometimes you ignore it, sometimes you incorporate it, and sometimes you cancel your project and wait, or you cancel it and start over from scratch.

28.5.6 Company Culture

A company centered in the Tao supports its own people.
What does it matter if there is a different way?
Our way is good for us and ours.

At any given point in time, company culture is best considered as a project boundary. It can be nudged in the short term and changed in the long term, but any approach to managing a project that completely disregards the current culture is going to fail.

Most of the original work on company cultures back in the 1980s focused on the changes that needed to be made to culture to support changes in strategy. In general, unless your project is a corporate change initiative, your job as a PM is simply to assess the culture and understand the degree of flexibility that particular culture affords you.

Figure 28.8 offers a highly simplified culture model that looks at where a company would fall along two axis. These are power versus collaboration and rules versus principles. Companies can function and function well in any of these four quadrants. The same might not be said about the PM and the team, so it's important to understand where a company is and how you and your team can best manage the project to be both happy and successful.

Beginning with companies aligned with the power/rule quadrant, most PMs will find that they have almost no influence on how their project gets done. The team and the stakeholders will all be looking to do things the way they've always been done and the way the "power holder" says they should be done.

In a collaborative/rule-based culture, the nimble PM will be confronted with "meetingitis," analysis paralysis, and lots of people saying that their opinions are not being taken into account. In this case, it goes without saying that things will simply take longer. The most extreme case of this I have ever seen was at a well-funded New England college. When I gave the management team a proposal that we could cut the project budget in half if they would simply agree to make timely decisions, they looked at me with sympathy and told me I didn't understand their environment.

The collaborative/principle quadrant is best viewed as a company composed solely of peers. It is the desired culture for most project teams, but since it doesn't tend to scale, it's rarely found in companies besides professional partnerships and small startup companies. In this situation people know what needs to be done and discuss what they don't know because they respect the opinion of the other individuals. Things get done in this environment because they are the *right* thing to do rather than because they *should* be done.

Companies with cultures in the power/principle quadrant tend to be companies with strong and visible leaders and a high reliance on trained technical people. Bill Gates and Microsoft would have fit into this quadrant as would Intel under Andy Groove. Creative firms also tend to fit here, like ad agencies and architectural firms where the founder has a significant reputation.

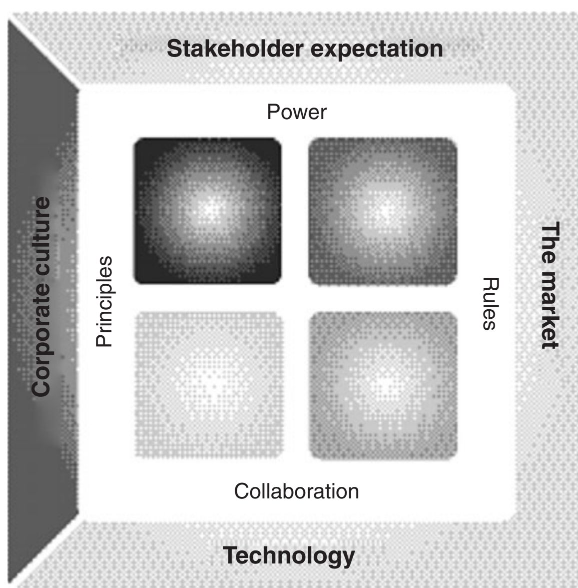

FIGURE 28.8 Corporate culture.

One of the problems many PMs have is assuming that the culture of a company is uniform. In fact, that's rarely the case, especially in a project environment. At its most extreme it is possible for there to be the culture the PM generally likes to operate in, the team's preferred culture, that of the stakeholders, and that of the company at large, and none of them are the same. Dealing with different cultures between the project team and the stakeholders takes some work, but it can be done. I once had a project where the client IT organization had processes and rules to cover everything and yet behaved and considered themselves highly collaborative. Everything they did took a very long time because it had to be discussed in depth before anything could happen. When they experienced a significant failure of a number of hard drives, they requested that the manufacturer replace the drives and just assumed it would be done the way they had done it in the past (by meeting and communicating with affected stakeholders and by taking 18 months to replace 2,400 drives). The hardware vendor (since they were paying) had a different perspective. The vendor's goal was to get in and get out quickly since time was money. In this case, the hardware vendor had allotted 90 days to replace 10,000 drives worldwide and hired a team of people who functioned quite well in the power/principle quadrant as opposed to the clients collaborative/rule culture. Compromise between these two cultures took some work, but in the end it was successful. The project took only 120 days from beginning to end, replacing 9,430 drives. The executive sponsor made the comment at the end of the project that even though he was unhappy that the project team failed to adopt the cultural mores of the company, he couldn't find anything to complain about since the project was done, and there weren't any complaints in his email.

Managing a diverse environment involves accepting the validity of the culture as an implicitly shared mental model. In most cases (the preceding example aside), it rarely matters that the project might take longer and cost more than you think it should as long as it operates within the guidelines of the company. In the final analysis, if you accept that the culture is right, you are then free to see what latitude you might be allowed within it.

28.5.7 Edge Factors

Accept what is and become free.
Bend in the wind and become supple.
Know that the sage advice of the past is still true.

As we move inward from our four boundaries, we encounter something that I call *edge factors.* Edge factors are much more under the control of the project manager and while they can all be lumped in as risk factors looking at them separately significantly increases the area of order available to a project manager. To show their interrelationship and their potential elasticity Figure 28.9 presents these four factors as a rubber band.

The edge factors generally have a higher degree of elasticity in the short term than the boundary conditions, which are usually fixed for the length of the project. With this in mind, while the rule with boundary conditions is to understand and accept; the rule with edge factors is understand and

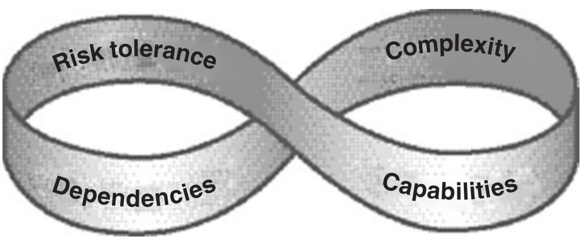

FIGURE 28.9 Edge factors.

then, as much as possible, increase risk tolerance and capabilities while at the same time decreasing complexity and dependencies. For example, an engineering group will always have a higher innate tolerance for risk than a manufacturing department. But a manufacturing group could accept more risk if a particular project was presented as highly important to their ability to stay competitive in the future (i.e., yes, it's risky, but we have no choice, and the rewards are significant).

28.5.8 Risk Tolerance

The amount of appropriate risk for a project is highly dependent on its circumstances. The first question that needs to be asked is has the organization classified the project correctly in terms of its inherent riskiness? Innovative projects that use new technology are risky. They positively and absolutely could fail. If the organization understands that failure is a distinct possibility, then there is by definition a high level of risk tolerance and a large area of order with regard to risk. If the organization in general is risk intolerant (expecting all projects to be on time and on budget), then project options are much more severely constrained.

One factor to consider is that the organization does not treat all types of risk with the same profile nor do all areas of a company share a similar risk profile. Based on your assessment of your stakeholders, the corporate (or business unit) culture, the volatility of the marketplace, or the urgency of the regulatory, and the stability of the technology (your boundary conditions), you need to see how much risk you can align with the tolerance of your stakeholders. Since the project isn't yet in full swing, you will only be able to influence what are commonly referred to as *high level risks.* The first five to consider are shown in Figure 28.10 and listed below:

1. *Timing Risk.* How much risk is there around the timing of your project? If there are many cross project dependencies (covered later in this chapter), then timing might be something to concentrate on locking down. If the market factors discussed above also seem tenuous, then the odds are very good that the project should be cancelled before it ever gets started.

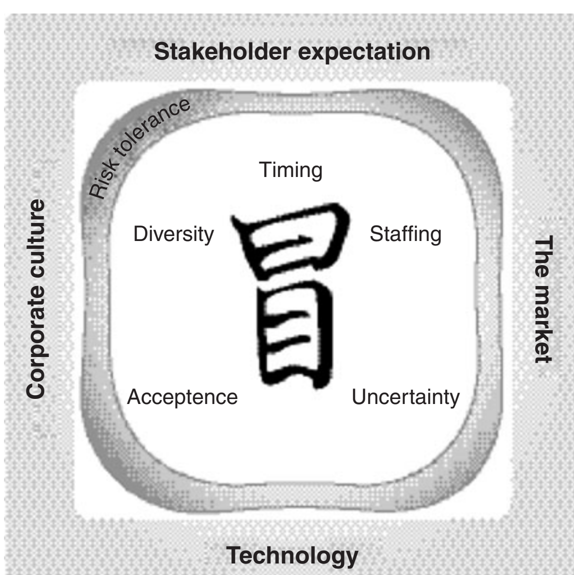

FIGURE 28.10 Risk tolerance.

2. *Staffing Risk.* Staffing risks are as multivariate as most things that have already been discussed. It isn't just whether or not you have the right number of bodies; it matters whether those bodies have the right skill and the right attitude. A friend of mine commented the other day that when he was a CEO, the only thing that really mattered was his skill in hiring and firing. If he made those decisions correctly, everything else usually listed as important tended to take care of itself. In my experience this is very true in projects. Get the right people in place, and the other risks can most likely be minimized. Get the wrong people, and everything else about your project had better be close to perfect.

3. *Uncertainty Risk.* Uncertainty risks have to do with the general fuzziness surrounding the project. Some of this fuzziness might be an early indicator that you are dealing with a wicked problem, as discussed in the section on complexity factors. But it can also just be lots of unknowns, most often about what the system should do and how. The most obvious solution to a high uncertainty risk is to adopt some sort of rapid prototyping approach at the beginning of the project—even if your stakeholders can't tell you what they want, they generally know it when they see it.

4. *Stakeholder Acceptance Risk.* Stakeholder acceptance risk gets missed as an important factor for project success more often than most of us in the community would like to admit. All too often the attitude in IT is "It's our job to build it, it's their job (i.e., the sponsor's) to make people use it." The problem is this just doesn't work in practice. Before starting on a project, it's important to know if the stakeholders even want the software you are planning to deliver. If the answer is no, then the project has to include a significant marketing effort so that by the time the software is ready, the demand is actually there (the alternative is shelf-ware which makes no one happy).

Another factor to consider is how many other things are changing in the end users' environment at the same time your project is going to be delivered. If there is much change and your project is just one more thing, then maybe you have a timing risk that you weren't aware of. If there is no other change but the business process underlying your solution is going to be highly traumatic, then you're back to potential shelfware. Sometimes the secret of increasing user stakeholder acceptance might not be as straightforward as you might at first assume. In one project a business unit was refusing to use the new software. After a closer examination, it turned out there weren't any objections to the software—the problem was they had been repeatedly requesting new hardware for their area and been turned down. They demanded new hardware in exchange for their compliance, and in the overall scheme of things, it was easier to give them what they wanted than to try to strong-arm compliance.

5. *Diversity Risk.* The final risk to assess in determining how much flexibility you have with regard to organizational risk tolerance has to do with the number of divergent opinions you have represented among your stakeholder community. This isn't an issue of people not knowing what they want—it's an issue of people wanting completely different things for completely different reasons and all of them hoping that your project will be the mechanism they have for fulfilling those desires. I have nothing but my own experience to support my next statement, but in general the higher the level of diversity, the lower the level of total risk that the organization can tolerate around the project.

28.5.9 Complexity

What makes a project complex is defined in different ways. Some of the usual measures of complexity center on the following questions about a project:

1. Is it mission critical?
2. Are the consequences of poor quality significant?
3. Is there a geographically dispersed team?
4. Is the proposed solution complicated in and of itself?
5. Are there divergent views among the stakeholders and project participants?

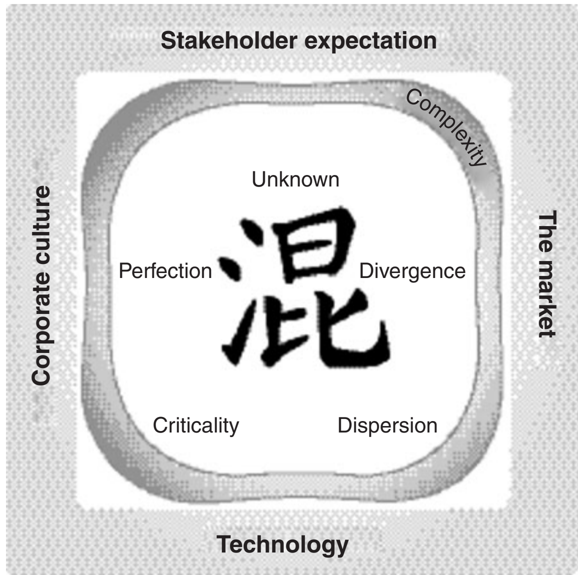

FIGURE 28.11 Complexity.

Figure 28.11 offers a shorthand notation to help you consider these factors. How great are the unknowns? How much divergence and dispersion exist? How critical is it that it be perfect?

Remembering that complexity is an edge factor will guide you as to how much flexibility you have in your approach to a project. Simple projects are open to any number of approaches; as you walk up the complexity scale, your options become progressively more limited, and your risk goes up.

28.5.10 Capabilities

Organizations have unique capabilities that define what they do well. For example, at Microsoft a belief that they can design and use software effectively to solve business problems is part of their corporate DNA.

Projects that contribute to or utilize a company's core capability will tend to do well—projects that require capabilities that the company believes are weak tend to require more effort, especially in the training and deployment phase. Specific elements to consider are (1) strategic capability, (2) organization capability, (3) performance capability, (4) change capability, and (5) skill capability (see Figure 28.12).

An example of the type of question you want to ask is does the organization have a formal strategy, and is this project consistent with its stated direction? All too often in IT the answer is a highly qualified. What that means is that someone has said the project complies with the strategy but no one is really sure why. There is a handy technique that any project manager can use to get a much better answer to this question than a tick mark on the project plan. The technique is called *inferring the strategy.* Essentially, if you look at the project and examine where it fits into the organization as a whole, you should be able to develop a strategy statement that accurately reflects your judgment of the project. An inferred strategy statement generally is constructed as follows: "If we are taking action X (the proposed project), which impacts the practice of Q to benefit group Y, then the outcome of this action will be Z."

Going back to Kennedy's vision of putting a man on the moon and returning him safely, one of the projects that would have been required was developing a propulsion system to get the rocket off

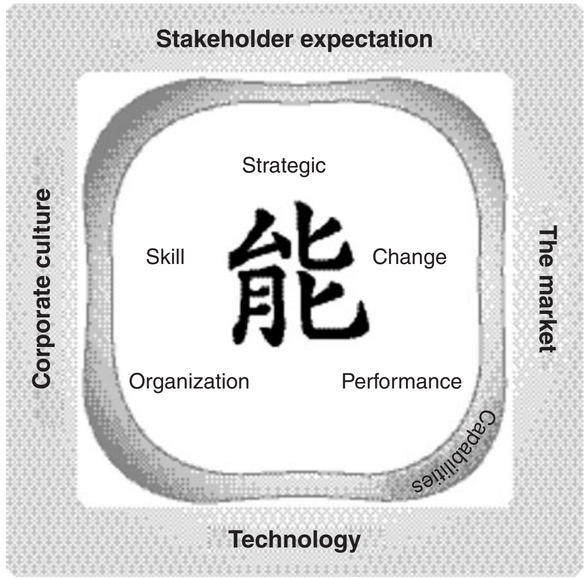

FIGURE 28.12 Capabilities.

the ground. "We are developing the propulsion system for the Apollo rocket which will support the manned space program and allow three astronauts to land on the moon and return safely to earth."

What happens if the strategy statement you infer has nothing to do with the official strategy under which the project was originally included? A possible and fairly common example of this would be a situation where the strategy is to do something that will attract or be used by external customers of the company, and the system gets co-opted into something that will improve the work internally. This isn't quite as dire a circumstance as it might appear. Very often senior management will jump to the end goal, forgetting that there really is preparatory work needing to be done first. By raising the issue of strategy misalignment at the beginning of the project instead of at the end, you can significantly increase your initial area of order. You also can uncover from another angle any problems you might have with stakeholder acceptance.

Another capability to consider is if the organization's performance measurement system is designed to measure this project's performance correctly. If the system is designed to show your particular project in a bad light, the secret is to address it earlier rather than later when it sounds like you are whining (it goes without saying that whining is never a good thing).

Can the organization deal with the level of change this project will create? This is a little different than the possibility of change resistance discussed earlier as a risk factor. This is the organization's general reaction to any and all change. High-tech companies tend to have a lot of change resiliency; a firm manufacturing handmade pianos the same way they have made them for 100 years might not be quite as comfortable with change.

The final factor to consider is whether or not the organization has easy access to the skill that will be needed on this project. What you are looking for here is whether or not the organization is good a recruiting. Are they good at training people who would be interested in acquiring the skills you'll need? If the organization is strong in acquiring skilled people or in training their own, then it doesn't really matter if the perfect resource isn't already on staff. For example, I had one project where sending an employee to a one-week course got me an instant expert, a very happy employee, and a significant increase in the odds of my project succeeding. Of course the culture supported this. The company valued their employees and was committed to keeping their skills cutting edge. In other companies I've solved the same problem by maintaining a good network of contractors who are happy to come in and solve specific problems at relatively short notice.

28.5.11 Dependencies

Dependencies are a little easier to recognize than complexity since they have to do with commitments existing between projects. In a perfect world a project would have something that a client of mine called *four degrees of freedom* as shown in Figure 28.13:

- **Degree 1:** The project can start at any time without regard to the completion of any other project.
- **Degree 2:** The project can succeed without requiring any deliverables from another project.
- **Degree 3:** The project has no deliverables to any other project.
- **Degree 4:** The project has no external dependencies (hardware, software, etc.).

What I particularly like about this concept is that rather than just referring to these factors as cross project dependencies, calling them *degrees of freedom* automatically tells us as PMs how much latitude we have in how we run our project. It also helps us determine what the difference is between a project and a program. A project with zero degrees of freedom is part of a larger program. It should be run as such or failure is reasonably well assured.

Projects with only the first degree of freedom (no start dependency) are pretty dicey as well if they aren't run as a program. I have seen PMs who realize they are dependent on each other simply combine their projects and comanage them without involving senior management in the decision. They have maintained the illusion they were separate by still using separate charge numbers and issuing two status reports, but in all cases there was one master "program plan."

The most common situation for most projects is that they have the first and the third degrees of freedom but are dependent on another project for a deliverable. In this case, another hard-and-fast

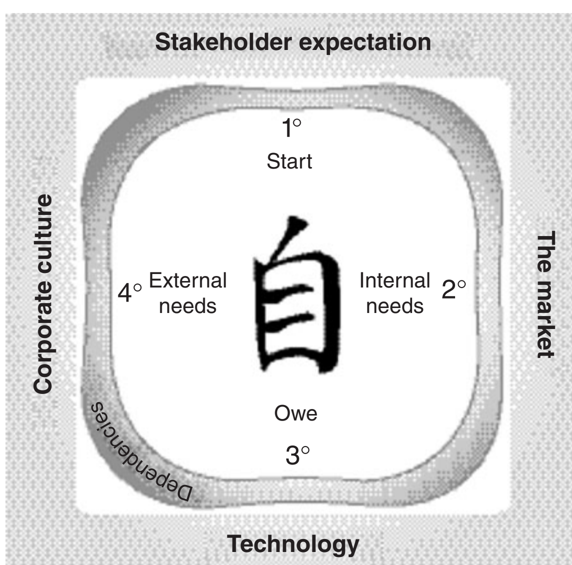

FIGURE 28.13 Dependencies.

rule comes into play. Once you realize that you are need something from another project your first activity at that point will be to define what the work around will be is if the deliverable doesn't happen and/or to determine how long the project can afford to wait. One final comment on this subject. If you find that the date for receiving the deliverable from the other project has come and gone and you are still waiting then you have two choices; either accept the work-around or cancel the project and restart it at a later time.

28.5.12 Taking Another Look at the Project Environment

All things are possible in time,
but all things are not possible now.
Change what you can, accept what you can't.

Up to this point we've discussed project boundaries—the elements listed around the outside of Figure 28.4. We've said that these elements need to be understood and accepted for what they are and a plan made for how best to live within these constraints. We've also explored the edge factors. The flexibility of the edge factors tell us how hard we can push up against our boundaries before we get slapped down. Everything to this point is analysis work we do and essentially keep to ourselves or share just with our senior team members. There can't be any value judgment about any of these elements—what is, is. Which brings us to the inner diamond of scope, time, people, and cost; these factors are directly under our control.

28.6 THE PROJECT MANAGEMENT DIAMOND

To say that scope, time, people, and cost are under the control of the project management might seem like an impossibility given that someone told you your budget, gave you a deadline, told you what staff you could have for your project, and then added insult to injury by handing you detailed requirements specifications with the instructions to "build this."

The truth no one wants to admit is that ultimately the project manager is in *control* of the delivery of the project. How much it ends up costing and when it gets delivered is the result of continuing to optimize the value (the cube shown in the center of Figure 28.4) against the reality of how long something really takes to develop and how much it will really cost.

28.6.1 Scope

Discussing scope, how to identify it and how to manage it, is a subject worthy of an entire book. This discussion will concentrate on only one factor. How to determine the smallest amount of functionality you can deliver and still comply with the value statements you've placed on each face of the value cube. Scope in this case is *not* the long list of requirements you gathered.[3] This statement is predicated on the assumption that change (the end deliverable of your project) creates more change. One of the single biggest mistakes most business process and software projects make is doing too much too soon. I realize this statement will be impossible for some people to accept, but that doesn't make it any less true. If any of us would be honest on the subject, we'd all have to admit that we've delivered functionality to a stakeholder that they never used. In fact, just in the last year I've seen several projects where the client decided to pay the company to take out some of the functionality they paid them to put in. So the two rules in scope are (1) simple is better, and (2) try it and see if you like it.

The next truism about scope is that it is inexorably linked to time in a nimble project. Scope can vary based on time, but allotting too much time to a problem can cause scope to expand beyond what can reasonably be delivered.

28.6.2 Time

> **Time is elastic and contrarian.**
> **When we wish it to slow, it speeds up.**
> **When we count the seconds, they take eternity.**

The second point of the diamond is time. I've recently heard a number of PMs pat themselves on the back saying that they refused to give management a due date. Instead, they have gotten management to accept a *range* of dates when the project would be done. While that might sound highly nimble, it will ultimately end up causing a problem. One of the tenets of nimble project management is always knowing where you are in the project vis-à-vis where you're trying to get. With a floating end date, the tendency is to gobble up your schedule reserve very early in the project on the premise that the problems just happened early and then when a disaster occurs later, there's nothing left to do but slide out the end date beyond the initially agreed upon date range.

After years of managing projects, I've developed a couple of theories that have consistently worked for me with regard to managing time on a project:

- Tell them (your sponsor and steering committee) early on that something can go wrong, and give them concrete examples of how much longer it could take if it does. In this case, presentation is everything. If you entered this discussion with your sponsor looking for more time, you will fail. If you approach it completely and totally committed to delivering the project by the date defined in the value cube, you will have enlisted an active partner in helping you manage the project.
- Remember TANSTAAFL (there ain't no such thing as a free lunch). A schedule slip of any sort needs to be consciously addressed. Believing that changing your baseline schedule is bad or wrong is a myth perpetrated by Murphy. Change your schedule every day if you must to keep on track with your end date. Reassign work, cut scope, get smarter, take advantage of good luck; use whatever tools are at your disposal at this moment in time. Remember, in the final analysis all that matters are the results.

28.6.3 Cost

IT projects have a particular peculiarity. Most of them don't really hold their project managers responsible for managing to a budget. Good financial control makes clients or managers feel like you are doing your job. Even if the project is one done internally for a company, being able to talk the language of money ensures that you the PM will be perceived as a good business person. I've also noticed that it's easier for people to make decisions when that decision is expressed in financial terms. If you ask whether or not Joe should spend another 100 hours doing X, you will almost always get an answer of yes. If you ask if it's really worth 10,000 dollars for Joe to do X, you will usually get a different answer.

28.6.4 People

Like most other subjects discussed in this chapter, the number of topics that can be covered on the subject of the people who actually do the work of delivering the end result is vast. In this case, I'm going to limit myself to the key components that need to be handled in order to define and expand your area of order.

The first and most important factor is to only hire change-resilient people. According to Psychologist Daryl Conner,[4] in order to respond with the requisite degree of resiliency, an individual should have a positive view of life as challenging but still filled with opportunities; they should be focused on what they want to achieve but be flexible in the demands they make on themselves and others while they're achieving their goals. Finally, an individual should be organized and proactive in engaging change rather than seeking to evade it.

While it's rarely possible to find a team whose members all have a truly nimble mindset, there are questions you can ask in the interview process to help you increase the change resiliency of the team. Rather than just concentrating on their experience in development or business analysis, ask a candidate how he or she dealt with a major change on a project. The answer you're looking for isn't just, "We extended the deadline and then made the changes," but an answer that says "We heard what they wanted, looked at what we were developing already, looked at the dates and the budget, and we worked it out such that we came up with the best outcome given all the constraints."

Short of hiring miracle workers in the first place, if you already have your team in place, and you have some folks who are less nimble in mindset than you would like, is there anything you can do to increase their flexibility? Begin by rewarding results, not compliance; by encouraging initiative and risk taking, not goal tending; by increasing your team's feeling of safety; and by remembering that success breeds success.

Some of these activities are self-explanatory, but creating a feeling of safety is a little more difficult. As a society we've begun to shift to a mindset in which performance criteria is taking a back seat to making everyone feel good. The atmosphere of safety that a nimble PM needs to create is one where people feel safe to learn approaches and techniques, to try things they haven't done before, and to express opinions on how a problem should be approached without fear of ridicule.

28.7 CASE STUDY

The goal of this chapter is to give concrete examples of how to adopt the Tao of Nimble PM as an aid to managing successful projects with less stress. To this point we have discussed crafting the vision, accepting the boundaries, and flexing the edges, and managing the diamond. With the theory established it's time to offer an example of what these techniques would look like played out against the backdrop of a real project.

Xavier Software made the decision to productize some of the software that had been developed to run its internal operations. One of the systems chosen to productize was the resource management system that had been developed in the field by Xavier Consulting. On accepting the assignment as PM, Gary Smith first began working with some of the most involved stakeholders and a few core project team members to define both the vision and the value of the project.

Gary explained to the team that a good vision statement answered the who, what, where, why, and when questions. After about 20 minutes of discussion, they agreed on the following answers:

- **Who:** All professional services companies that managed resources
- **Where:** Worldwide
- **What:** Ship software running on a Xavier platform that would integrate with the rest of their ERP suite
- **Why:** To solve the common complaint of most companies that they can't manage their people effectively or efficiently
- **When:** In the next nine months

Gary then asked each team member to develop a vision statement and to write it up on the white board. Gary had learned from hard experience that this technique saved about two hours of the process of crafting a vision statement since it tended to limit discussion to just what had been suggested rather than spend hours trying to get every word right. After about 20 minutes the group agreed that the following vision most closely reflected their thinking and had the advantage of being under 25 words: "Help professional service firms solve their resource scheduling needs by shipping Xavier Resource Management (XRM) to a worldwide market in the next nine months."

The next task was creating a value statement. Gary realized the value statement was going to take some work because one of the key unique factors on this project was that he had two distinct groups of stakeholders. The first was made up of the companies who might choose to buy XRM; the second, and in this case more immediately important, group of stakeholders was Xavier consulting itself. Knowing that value lay at the very heart of the project environment, Gary suggested to the team that the value statement be tailored to the needs of Xavier Consulting. If the vision addressed the end customer market and the value addressed the needs of the internal stakeholders, Gary suggested that the project should be right on track: if Xavier Consulting needed it, then end customers probably did as well.

The next activity Gary chose to do in his kick-off meeting was to determine the six sides of the value cube (Figure 28.3). The team decided on the following values:

1. The dollar value of the project was set at $2 million.
2. The time value was set at the nine months called out in the vision statement.
3. The sponsor value was a shippable project management centered application.
4. The stakeholder value was a more robust and integrated version of their current tool.
5. The customer value was a resource management tool that integrated with the rest of their ERP suite.
6. The team value was to work on the newest product with the newest technology.

The next day after the kick-off meeting, Gary sat down and began to review his boundary conditions and edge factors. To make things easy on himself he created a simple table (see the chart in Figure 28.14) where he could record his perception of how large his area of order might be with each of the four project boundaries and each of the four edge factors. Gary realized that if he added a numerical factor to his assessment of the area of order, he could use that to plot a radar graph and visually see how much room he would have in running his project. Additionally, Gary hoped that by doing this he might come up with new ideas on how he could expand the area of order he already had.

Looking at the graph Gary determines that in a perfect world his sponsor's low risk tolerance and the pressure from the marketplace would best be reconciled if he could take his team and go find a spare garage they could work in (an honorable tradition in Silicon Valley). Unfortunately, Gary knows there is absolutely no way for him to make it happen. This product is an "official" project and one of the reasons it's being done is so product development can provide structure and guidance so the product can be sold commercially. This means he will have to accept the sponsor's day-to-day oversight and her level of risk tolerance. The complexity factor is worrying, but there are ways to deal with remote teams—besides, the U.K. team is where all of his knowledgeable business analysts live, and without them he knows he can't develop good software. Even if the sponsor would rather not have them on the team, as long as Gary keeps an open line to them through the requirements and design phase, the project should be OK.

Having completed the work of understanding boundary conditions and edge factors he is now ready to begin some serious work on the 4 factors of scope, time, cost and people that comprise the project diamond we looked at in (Figure 28.4).

1. *Scope.* The project had a decent high level design document, and the business analyst had done some pretty good work in defining what areas of the current product everyone thought should be enhanced. The big issue with scope wasn't what *should* be done but what *could* be done with the current technology. Some of the desired enhancements simply didn't make sense to do with the currently available technology. Unfortunately the group working on the next release of the development tools kept promising delivery next month. A promise they'd already made three times and rumor had it that they were actually running at least four months late as it was.

2. *Time.* The product manager kept screaming that if this product wasn't ready to ship by June, they were going to miss their window. The executive sponsor, on the other hand, kept saying it was more important to do it right than make a certain date. Gary knew the product manager was probably right as far as it went, but did that really matter?

Factors and Conditions	Amount of Order	
Stakeholders and Sponsors	2	There are two distinct groups of stakeholders, the end customer and the internal consulting customer and the Sponsor is from Product Development. Balancing the two will take a considerable amount of effort and will add a deployment phase to the project for the internal customers.
Market Conditions	3	There is a small market window for this product. Xavier's major competitor doesn't have anything yet but word on the street is that they're investing heavily. Xavier has an advantage if it can get to the market first since the Xavier product will have the advantage of all the fine tuning gained by actually using the functionality in the field for five years
Technology	4	Some of the technology that should be used for this product isn't out of R&D yet. It's scheduled to ship three months after the project starts. Other than that the team understands the technical environment well. The market also accepts the planned platform as being high quality already which gives some options if the new components aren't ready in time.
Culture	2	The culture is not deadline driven. If anything goes wrong the usual response is to simply add time. This is at odds with the market place requirement
Capabilities	5	Xavier develops top quality software and this is just one more product in an area the company understands. Additionally the software is run and understood internally so Capability factor is high
Risk Tolerance	2	The sponsor got burned once for releasing a product too early. She also subscribes to the attitude "no one ever got fired at Xavier for being late with a product"
Complexity	4	The team is split between the U.S. and the U.K. There are some known personality conflicts between some of the team leads and all the SMEs live and work in the U.K., leaving the U.S. team free to ignore them.
Dependencies	3	There is a dependency on the technology group to deliver some new tools but the software can be developed and released without it

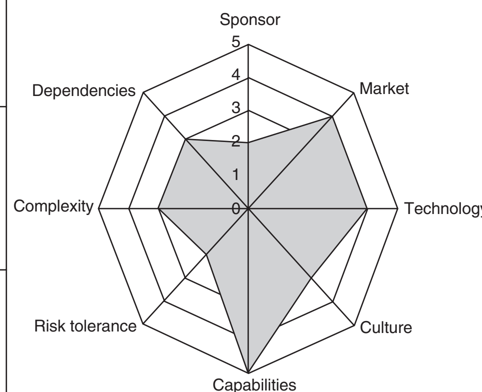

FIGURE 28.14 Gary's area of order worksheet.

3. *Cost.* The one thing Gary knew was going to work in his favor was the fact that the company didn't track anything below the level of the entire development group. Gary's team of 15 was hardly going to be a ripple in a 110 person budget. So if no one knew what his project was costing, no one could complain it was costing too much.

4. *People.* This was definitely going to be Gary's problem area. It wasn't that the team wasn't decent; it was that no one on the team was really sure they wanted to work for him. The development manager in the U.K. made it clear every time he talked to him that he considered his inexperience a significant liability to the project, and the product manager wasn't much better. On the other hand, the executive sponsor was completely supportive of his efforts. It would help to be able to get some resources of his own choosing on the project so the team could jell, but that was probably going to have to wait until the project hit the development phase.

Gary looked at what he had written about constraints and edge factors and then weighed these against the four corners of the project diamond and came to a conclusion. He had two choices about how to run the project. The first was to listen to the product manager and the development manager in the U.K. (who had worked on the first versions of the product) and build the tool with current technology and get it out the door pronto—even if he would later rewrite significant portions of the code in order to take advantage of some of the new features the tools group was delivering. Or he could chose to accept that while the technology was chancy and his market window was very small, his 100 percent backing from his executive sponsor made all of the other problems simply go away. After all, why should he kill himself and the team when the sponsor was saying, “Let’s wait. We should do it right the first time. We can always find a market for the product. After all, we’re Xavier Software; our clients will wait”? Weighing the two alternatives Gary knew instantly which one was right for him.

Was Gary’s decision to wait to develop the product the right one to make with the advantage of 20-20 hindsight? The product ultimately shipped a year and half late to a completely flat market. The product failed to make any significant market penetration outside of exiting users of Xavier’s suite of software products. On the other hand, his executive sponsor was delighted with the product. It integrated well with the other tools in the suite, and since it was developed on the latest technology, it didn’t need to be refactored or retuned. Additionally, while it might have failed to capture a significant share of the external market, the internal users were happy with it once they finally got the product up and working, which for them was two years later than they had originally hoped.

From Gary’s point of view the decision was absolutely the right one. Most of the team in the U.K. resigned as did the product manager. Additionally, the actual market window for the product turned out to only be around six months before the market began drying up. This meant that even if he’d shipped on the date the product manager had requested, the market never held long enough for the product to have made much of an impact anyway. Looking at it from Gary’s perspective, his decision that a satisfied sponsor was more important than market timing was absolutely right.

28.8 CONCLUSION

It might surprise you that I chose a case study based on a project that wasn’t wildly successful and was run by a brand new project manager, but it is exactly the shades of gray where this approach works best. Crystal clear situations take very little conscious thought in order for the PM to make good decisions. The Tao of Nimble PM helps when it’s unclear what is the best thing to do in a situation where there possibly isn’t a clear win.

The final piece of wisdom contained in the Tao of Nimble PM is that there is no such thing as the perfect project. Some projects are easier than others, but none are perfect. If we wish to stay in this profession, we need to accept that some things will always go wrong and that the products we deliver at the end of our projects will always be a compromise. With that said, as silly as it might sound, managing projects is fun if approached with the right attitude.

28.9 REFERENCES

1. See www.apln.org for more information.
2. James E. Webb and Robert S. McNamara, memo to the President, “Recommendations for our National Space Program: Changes, Policies, Goals,” May 8, 1961.
3. Like everything else in life there is an exception. If the project is being done for compliance reasons, then many, if not all, of the requirements might have to be literally interpreted. This isn’t a problem since scope, requirements, and value become very tightly aligned, leaving the PM with a high degree of order.
4. Managing at the speed of change by Daryl Conner Villard. NewYork, 1992.

CHAPTER 29

ADVANCING PROJECT MANAGEMENT PROFESSIONALISM AND CULTURE IN YOUR COMPANY

Morten Fangel

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After years in consulting engineering companies, Morten Fangel founded Fangel Consultants Ltd., from where he has acquired more than two decades of experience in management consulting. He introduced and is a specialist in methodologies for project preparation and startup processes and for the planning and evaluation of project management. He is a former president and chairman of the IPMA (International Project Management Association). Today, he organizes annual IPMA Advanced Courses. Additionally, Morten Fangel is a founding member of the Danish Project Management Association, of which he is the executive director and manager of the IPMA Certification © in Denmark.

Morten Fangel has issued and edited numerous books on project management—in both Danish and in English. The latest book in English is the National Competence Baseline for Scandinavia, *Competencies in Project Management.* He also regularly presents papers at conferences organized by IPMA as well as PMI. He is an Honorary Fellow of IPMA, the International Project Management Association and an honorary member of the Icelandic Project Management Association.

29.1 INTRODUCTION: TWELVE INSTRUMENTS FOR ADVANCEMENT INITIATIVES

The effort to continuously advance project management professionalism is part of every successful project-based company. But this advancement process is a task not only for the company management and various specialists dealing with competence and method development. Your own competence in managing projects includes contributing to an ongoing and constantly improved management of projects—at both the project level and the corporate level.

The following pages offer an opportunity to consider and evaluate the effort delivered until now by yourself or your company toward advancement of project handling and to learn how those efforts can be improved. A portfolio of 12 instruments is presented for your use, covering the classic methods, such as development of guidelines and training, and modern methods such as coaching, sparring between project managers, and organizational changes. Included in the descriptions of these instruments are explanations of how to utilize the Scandinavian National Competence Baseline as a tool[1] for self-assessment of your competencies level and as a resource for developing other advancement initiatives.

The list of 12 instruments will be applied later to extract experience data from two examples that illustrate means for successful advancement of project management professionalism in organization and corporate settings. In Case 1, Palle Buus Jensen reports on applied means at The Royal Danish Air Materiel Command. In Case 2, Henning Skovhoej reports on applied means at Siemens A/S, Denmark.

Because the 12 instrument descriptions and their later specific applications in the two cases are structured according to an identical list, you can refer to each instrument's general observations and the corresponding experience gained within the two organizations.

This chapter, therefore, focuses on *how* the desired improvements in project management are achieved rather than dealing with *what* competent project management is.

29.2 IMPROVEMENTS ARE REQUESTED BUT CHALLENGING TO ACHIEVE

Today's corporate world is fast-paced and highly competitive. There is almost zero tolerance for mistakes, wasted time, or unwise allotment of funding for company projects. This means that it is in each company's self-interest to make a conscious effort to advance its level of project management competence by facilitating programs that include not only project managers, but also project owners and project participants. Many reasons for this are obvious:

- Customers themselves increasingly make demands regarding management of projects, including demands that the project managers be certified, or for established competence in project management to be otherwise demonstrated.
- A growing number of companies designate project management as a strategic competence, that is, a precondition for company activities.
- There are demands from employees for improved working agreements while they serve as managers or participants in projects.
- Turnover or reassignment of project managers in a company creates the need for ongoing competence advancement of the new managers, along with a renewed effort to maintain competencies levels and the existing project culture already achieved.
- There is demand today to extend the range of special competency skills in project management—for example, facilitating advancement from *steering* project managers toward *communicating* project managers.

However, meeting these demands poses many challenges for project managers, project owners, and each corporate entity:

- It is one thing to individually learn project management methods by heart, but quite another to carry out all the good intentions in practice—that is, to succeed in incorporating and applying the methods automatically.
- It is also a challenge to broaden competencies in the organization—to develop from reliance on a few project management "superstars" to the more advanced stage of many employed in routine performance of project management.
- It takes constant effort to keep an ongoing improvement process alive. For example, the networking groups among project managers often shrink after a few meetings because it is almost a natural law that employees in an organization relapse into the "line behavior" if the corporate project management concept is not continuously revitalized.
- Maintaining a project-based organization requires altering the power structure in the company—by definition a major challenge.

To sum up, advancement and maintenance of an improved project management level in a company can prove to be a more challenging task than expected. Although successful handling of projects is a matter of experience and methods, it is also partly dependent on the modification of behavior, personal adjustment, and self-knowledge that is required from management, project managers, and project participants.

29.3 TWELVE INSTRUMENTS FOR ADVANCING MANAGEMENT PROJECTS

Now we turn to the presentation of the 12 instruments for advancing the management on projects in your organization.

29.3.1 Instrument Number One: Managing the Advancement Process

The process of advancing project management professionalism and promoting a project management culture can first be measured and evaluated in broad terms. Your first move is to define the *scope of the advancement process:*

- One possibility is simply to open up for ad hoc initiatives, for example, participation in external courses and ad hoc introduction of new methods and tools.
- Another possibility is to plan a coherent advancement process, perhaps based on an analysis of requirements and a focus on describing selected methods and tools together with organization of relevant courses.
- A third possibility is to apply a broad spectrum of instruments in an integrated development process aimed at advancing the performed competencies of project managers in order to achieve real and optimal improvements in practice.

Figure 29.1 allows you to characterize the present scope of efforts for advancing project management in your company up until now—as well as recommended plans for any future advancement effort.

Note that the three alternatives presented in Figure 29.1 also reflect changes in the way companies are approaching the improvement of project management. The following list describes these approaches:

- Their first step may have been to make a single initiative based on the idea that project management is something that simply has to be learned and perhaps supported by some tools.
- After recognition that the effect of ad hoc initiatives has been modest, more coherent advancement processes have been put in place, but still with focus on courses and methods. But this type of effort may result in limited effect on exercised competencies.
- Therefore decisions may be made to handle the advancement task as a development process. Such a process could include other instruments aimed at changing the real handling of projects.

Concerning *organization of the advancement* effort, you should distinguish between the options offered in three alternative concepts:

- One option is that advancement initiatives are simply handled by units of the line organization, including the existing staff function of Human Resource Development.
- Another option is to apply the project management concept, that is, to handle the advancement initiatives as a cross-organizational project (but perhaps using the term *process* or *program* to avoid confusing the process contents and the management concept).
- A third option is to form a unit in the organization—for example, a project management office—to manage the advancement processes and to act as a "Center of Excellence."

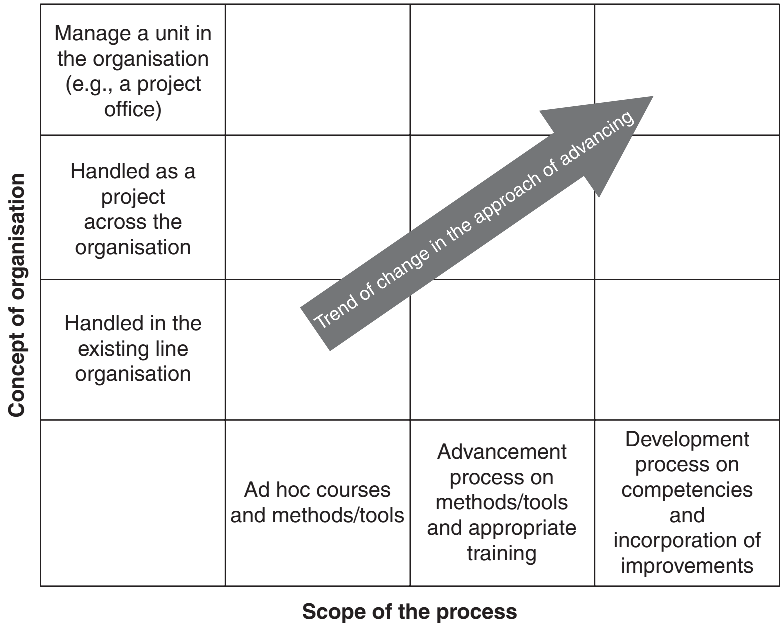

FIGURE 29.1 Scheme for characterizing definition of the present and future scope of the organization's efforts toward advancement of project management.

Once again, we recommend that in Figure 29.1 you characterize both the present scope of efforts for advancing project management in your company and the recommended future way of organizing the effort. As you pass from first to second and third scope definitions, the requirements for organizing the process also increase. The arrow in the scheme links the typical characterization of today and the typical characterization of how the future effort toward advanced project management should be defined and organized.

Management of a total development process—corresponding to the upper right square in Figure 29.1—will be discussed in later pages. However, some points from that discussion can also serve here as suggestions for related aspects of the advancement process.

In practical application, the entire development process can be divided into *three main focus areas:*

- **The entire advancement process:** process management, anchoring of the advancement, and clarification of the advancement requirement
- **The project level:** advancement of project methods, training for project involved, coaching of project managers, and assistance to project management
- **The company level:** promotion of exchanges of experience, career path for project managers, organizational initiatives, development of portfolio management, and evaluation of the advancement effects

In Table 29.1 you will find the 12 instruments listed according to each of the above-mentioned areas. This scheme can be applied as an overall work breakdown structure for use in processes/program/project plans designed to advance project management professionalism. But the scheme is not intended to be a phase division or a milestone plan, although the selected order does represent a logical structure. The relevant instruments as well as the timing should both be considered when planning the advancement process in your company.

TABLE 29.1 Methods for Advancing Project Management and Project Management Culture

Advancement process	***1. Managing the advancement process*** • Planning coherent advancement process • Establishing internal advancement group as initiators ***2. Anchoring the advancement initiatives*** • Anchoring the effort solidly at the company management ***3. Clarifying need for advancement*** • Analysis of strong/weak points in the project handling • Inspiration via conferences or introductory seminar/course • Benchmarking as to other companies/projects • Evaluation of total level of maturity as to project culture • Suitable improvements of the management of projects in brief
Project level	***4. Developing project management guidelines*** • Project guidelines with focus on improvement • Paradigm for project manual with forms • Platform for virtual communication in the projects • References to good examples and experience of colleagues • Method description in literature or course materials ***5. Training project personnel*** • Internal basic courses for project managers, project participants, and project owners • Extended training courses for project managers • Course sessions incorporated in current project process ***6. Coaching of project managers*** • Focus on planning and evaluation of the project management • Sparring/coaching of the project manager during the project process • Review/audit of the management effort in the project ***7. Assisting project management*** • Facilitator at organization of introductory/start-up seminars • Project guides assist in the daily routine • Facilitator at final evaluation of the project handling
Project company level	***8. Facilitating exchange of experience*** • Rules for learning and communication concerning management of projects • Internal forum/network for project managers and other involved parties • Participation in seminars/symposia—prepare and give lectures ***9. Project managers' career paths*** • Certification as a lever for competence development • Ensure status for project managers via formal career path ***10. Changing company organization*** • Project office as initiator and support for improved handling ***11. Advancing portfolio management*** • Prepare the scope of project orientation in the company • Graphic presentation of all projects including the anchoring • Prepare priorities and reporting of the projects • Management proactive role as to the projects ***12. Evaluating effect of PM advancement*** • Systematic estimate of short- and long-term effects

In general we recommend applying a *broad range of instruments* to ensure that the requested improvements take place in the practical performance of project management. Further, we have learned from our consultancy that the effect is increased when the advancement process focuses on *achieving a limited number of improvements*.[2]

The easiest way to control the process is to arrange a stepwise tactic, starting by applying one instrument, then another, and so forth. However, you should remain alert to possible loss of the momentum, the impact—that synergy that normally results during effective handling of the practical aspects of project management.

In all cases, a precondition for achieving any effect is that some one person *assumes responsibility* for the agreed-upon effort, and that the planned advancement of project management in the company is controlled. Further, we recommend that all initiatives be closely linked to the *management of specific projects,* programs, and project portfolios, and that a *stepwise anchoring* takes place based on visible results and achieved effects.

In the following sections, we will describe each of the other 11 instruments. In parallel to reading each section, you are encouraged to read about the experience gained from application of these instruments in the case studies from The Royal Danish Air Materiel Command and Siemens Denmark.

29.3.2 Instrument Number Two: Anchoring the Advancement Initiatives

It is important to anchor both *upward* and *outward* in the organization in order to achieve real impact from the advancement process. Concerning *managerial anchoring* upward, it is obviously a management responsibility to develop competencies in the organization. The management must recognize the need for advancements and ask for them, understanding the old rule: You get what you go after and what you can control.

However, it is not that simple to persuade top management, because programs for improvement of project handling typically will intervene in the management's *own* concept of management. Thus, simultaneously with their steering role in the process, the company management will become a *target group* for the improvement effort.

A "mechanistic control" of the advancement process is not enough. In the introductory phases especially, management must spare time to exercise an "organic management" type of involvement in the process. It is also useful to secure broad involvement of the company's project managers and other key persons. This promotes acceptance of the need for improvement, and their involvement can also contribute to training and facilitate the exchange of experience. Your basic approach should be to meet both the management and other participants at their current level of project management and to demonstrate what value an improved project management will generate. One way to do this is to create involvement via a series of workshops that may form a visible "backbone" in the development process. Workshops have also proven to be a suitable instrument for encouraging managers and resource persons to take responsibility in the process.

29.3.3 Instrument Number Three: Clarifying Need for Advancement

The necessity to clearly describe the need or the problem that triggered a company to initiate an advancement process is hardly breaking news, but it is surprising how often this requirement is left unclarified while other instruments are applied prematurely.

During such a requirement clarification, it is essential to *clarify the importance* of the proposed advancement process in the company. Will the advanced project management result in any of the following:

- Strategic consequences regarding which tasks the company can handle
- Tactical consequences for improved handling of a specific project
- Operational consequences in line with other operational skills

In most cases, the company management, the project managers, and project participants are well aware of the problem and know what should be done. Good project management is simply systematized common sense. The challenge is to do what we know is *right* and to drop the *wrong* conduct. *To make common sense common practice!*

Initially, securing a broad involvement plus a brief wording to formulate what is already known, can lay the groundwork for more successful projects, thus gaining many of the desired improvements.

You can make an even more systematic evaluation of the company's total level of maturity concerning management of projects based on the 34 method application competencies and 10 leadership behavior competencies as described in the book *Scandinavian National Competence Baseline*.[1] To answer, "How professional is the project management per element, and is advancement needed?" you begin by analyzing your company's present stage and clarifying the need for improvements. Or the evaluation could be made by using the 10-step scale as described in the book. The precondition for applying this instrument is that the user has knowledge of the range of methods and behaviors required in project management. It is further recommended as part of a requirement clarification that you record best-in-class examples of application of methods and project management tools. This will graphically illustrate both the company's requirements and the possibilities—and facilitate anchoring.

29.3.4 Instrument Number Four: Developing Project Management Methods

Choosing an appropriate set of methods and tools for project handling is also an important instrument. For users, the optimal choices are those methods with brief and very specific related descriptions, but also methods which are applicable in general across projects—requirements that are difficult to fulfill.

One solution could be to prepare guidelines for the entire company focusing on procedural principles and rules as they are related to the most important improvement areas. For example, if it is accepted that the project start-up processes are an improvement area, you could state the principle that a project start-up workshop should always be organized in connection with projects of a certain complexity/size. Another principle could be that the project owner, as a minimum, should participate in the opening session and/or closing of the workshop.

When formulating these guidelines, we recommend a gradation of each method and tool according to the project complexity. Distinguish, for example, between project management concepts 1, 2, and 3, and recommend for each of these the appropriate methods and tools.[2] After a master project plan has been approved for a noncomplex project, it may be enough to arrange a start-up meeting lasting a couple of hours. For a limited complex project, a full-day start-up workshop may be relevant. For a highly complex project, an initial start-up workshop of two to three days with professional facilitators may be needed, followed by subsequent workshops per subprojects.

Today, IT-based tools including Web sites are breaking down some former limits that required supplying the corporate guidelines in fine and extensive ring binder form.

We recommend that you refrain from preparation of an extensive "tool box" for project management. Instead, generate a simple project management model from which you can reference and link to recommended methods in literature and also to good examples in the company, that is, you establish the project management guidelines based on the existing knowledge.

The 34 method application competencies in the *Scandinavian National Competence Baseline* book can be used as a "rack" for these simple guidelines, which consist mainly of references and links.[1] An advantage of this model concept, with its links to literature and examples, is that it eases the maintenance expenditures incurred with a tool box resource. Another advantage is its almost free updating via access to new editions of external literature.

29.3.5 Instrument Number Five: Training Project Personnel

Organizing project management courses is the classic instrument, and many development processes in companies are started in this way. However, the effect of courses may be surprisingly modest. This especially seems to be the case for open, external courses. Unrealistic expectations may be one reason for less than optimal results. A three-day course that includes training in a large number of methods does not allow the participants to try out free juggling of all the methods in their own projects. It later proves difficult to put the course learning into practical project handling. This gap becomes quite obvious when we are assessors for the certification of professional project managers.

It is, therefore, recommended that training activities be linked with practical project management as much as possible. Especially during project initiation, such possibilities usually exist. If possible, opportunities for practical exercises should be included in project management courses, especially if an examination takes place at the end of the training. The positive effects of the training activities can be increased by designing in-house courses based on extensive requirement specifications, covering both topics and scope of learning. Once more, we refer to the *Scandinavian National Competence Baseline* which has proved to be an effective tool for prioritizing training topics.[1]

Further, we have observed the highly positive effect of using this book for individual self-assessment of competencies in project management. Self-assessment is a strong training instrument—perhaps even stronger than traditional classroom training.

29.3.6 Instrument Number Six: Coaching Project Managers

As a supplement—or alternative—to the training process, the project manager can have a personal coach or a sparring partner. We use the term *coach* if the primary aim is to develop the competencies of the project manager and the term *sparring* if the primary aim is to improve a current management effort. In both cases, the aim is to assist the project manager in applying his common sense. As a pivot to aid the coaching or sparring process, we recommend that the project manager prepare by writing a formal planning of his/her own management effort.[3]

For control purposes, a formal review of the project manager's effort might be useful. Depending on how the review is carried out, it could serve just as well as the basis for a structured coaching or sparring process. As a reference model for coaching/sparring reviews we refer once more to the *Scandinavian National Competence Baseline*[1] concerning the method application and the performed leadership behavior.

29.3.7 Instrument Number Seven: Assisting Project Management

To advance the levels of the project management, you could offer specific assistance at the more challenging stages of a project's process. The assistance might be of two types: (1) *advising* or assisting in the handling of project management tasks—for example, preparation of risk analyses, a master project plan, or a project status report, or (2) *facilitating* cooperation activities around project management issues at crucial stages—for example, facilitate a project start-up workshop or close-out meeting.

Assistance during the initiation stage of a project is also a matter of *communicating experience* while the "clay is soft" and it is still possible to choose an alternative approach other than that previously used for management of projects. Another important task for the assistant is to arrange a time-out that can lead to learning. Such assistance could be given ad hoc among the project managers or by internal or external consultants.

29.3.8 Instrument Number Eight: Facilitating Exchange of Experience

Now we reach the level of the "learning organization" or "knowledge management" concerning management of projects. The ideal vision is to gain a company culture in which the project managers communicate acquired learning—and where new knowledge on project management is accessed whenever needed. However, this is seldom the case in hectic everyday life where current challenges in the projects require all the attention—and even more.

Typically, a specific "mechanism" is required to ensure that the communication of experience takes place. At company level a *project forum/internal network* is a powerful instrument, assuming that a person is responsible to maintain the intensity and ensure profit from the communication contacts. A way of promoting this benefit is to stipulate that each participant formally plan and evaluate his/her own management effort. This material can be used as a combined logbook and activity plan for the project management.[3] At the network meetings the project managers can give sparring to each other in turn, based on the logbook/activity plan. This ensures a more specific dialogue, and experience shows it is more relevant than merely a free exchange of experience. Registration for certification as project manager can also serve as a vehicle for both continued activity and an intensified network among the project managers.

29.3.9 Instrument Number Nine: Project Managers' Career Paths

A formalized career path for project managers is an instrument needed to prevent good project managers from leaving the company. A career path can also serve as a vehicle for advancing the level of project management. The formalized career path makes project management a *visible discipline* in the organization because the required levels of competence are specified. Once more, we refer to the *Scandinavian National Competence Baseline* as a reliable tool for specifying competence level per stage in a career path.[1]

A way to support and create respect for a career path is to apply the *IPMA Four-Level Certification Program*. This certification process serves as a lever for competence development and as documentation for the competence levels.

29.3.10 Instrument Number Ten: Changing Company Organization

Formalization of the career path of project managers may in itself signal an initial adjustment of the company organization. Other organizational initiatives could be the introduction of project portfolio directors to handle projects that share the same resources, or designation of program managers to ensure that the requested, long-term benefits from a bulk of projects are realized.

In recent years, there is a tendency in major organizations to establish project management offices that function as centers of excellence, supporting the whole range of initiatives aimed at advancing project management and serving ongoing portfolio management.

29.3.11 Instrument Number Eleven: Advancing Portfolio Management

In relation to projects that fall within the company's core area, portfolio management is usually well controlled. But, concerning internal development projects or cross-organizational strategic programs, the portfolio management is often a distinct "area for improvement."

The rule of thumb is that it is most practical to first concentrate on advancement in the levels of project management—and then improve the portfolio management later.

29.3.12 Instrument Number Twelve: Evaluating Effect of PM Advancement

As a final instrument in the advancement process, we recommend making periodic evaluations of the achieved level of projects management professionalism. *Do we adequately practice the stipulated improvements?* As mentioned before—we get what we can control.

Such evaluation is not only a reactive control at a time when all resources have been used, it is a proactive instrument for keeping up spirit in a development process that might shrink during some periods of company activities.

29.3.13 Further Thoughts on Successful Advancing of Project Management

It is the company management's responsibility to initiate advancement processes for the management of projects and to organize and control the effort. Part of this task is to *allocate time* for project owners, project managers, and project participants to *master the requested competencies.* For example, the effects of many good courses have been limited only because training of new methods and improved conduct have not been possible in the hectic everyday life of most companies.

It is also a company management task to *change its own methods and own conduct* in order to achieve needed advancement of project management professionalism and a project management culture.

Finally, improved management of projects is also the *responsibility of all involved* in the specific projects. As project owner, project manager, or project participant, you should be competent not only to handle your tasks "as usual," you must also be competent to contribute to ongoing advancement of the way we manage our projects!

CASE 1: IMPROVED PROJECT MANAGEMENT AT THE ROYAL DANISH AIR MATERIEL COMMAND[2]

Palle Buus Jensen, Chief Engineer, The Royal Danish Air Materiel Command

Until the end of 2006, it was the responsibility of the Air Force Materiel Command (AMC) to ensure that the Danish Air Force's many complex systems were functioning and that new systems were procured. From January 2007 the AMC is being fully integrated into the Danish Defence Acquisition and Logistics Organisation (DALO) together with the materiel commands of the two other services, army and navy.

Procurement of military materiel results in a large number of projects of various complexities, and the handling of these projects has always been very important for the AMC. But over time, as both the complexity and the interdependence of the systems grew, the AMC project management has been increasingly recognizing project management as a separate professional discipline—not to be handled as a minor task. The importance of project management professionalism will continue to be carried on in the newly formed Danish Defence Acquisition and Logistics Organisation.

1. Manage the Advancement Process

In 1999, a more structured process was approved to increase project management professionalism in the AMC. This resulted in initiation of an advancement process in the early summer of 2000. The process was carried out during 2000–2001, and the results were implemented in the organization during 2002–2005—a resource-consuming process because it also involved changes of culture. From 2007, the initiated process with its ongoing advancements based on gained experience will be continued in the new organization (DALO).

Experience from managing the process can be summarized as follows:

- Establish a core group comprised of both voluntary and engaged persons to manage the process.
- Extend the core group with external consultant assistance to add expertise and secure focus and progress.
- Develop a well-prepared master project plan and a detailed resource budget before initiation of the process.
- Ensure a solid and very conscious anchoring of the process in the top management.

The diagram in Figure 29.2 demonstrates how application of the 12 instruments has varied during the entire advancement process.

2. Anchoring the Advancement Initiatives

The main objective of the process was to change the attitude regarding management of projects in the organization. Such a change of attitude requires a full and wholehearted support of the process from the top management—leaving no doubt about the commitment of the management to promote successful implementation. On the other hand, the process must also be anchored among the employees in order to promote this change of culture. We applied the following to strengthen the anchoring:

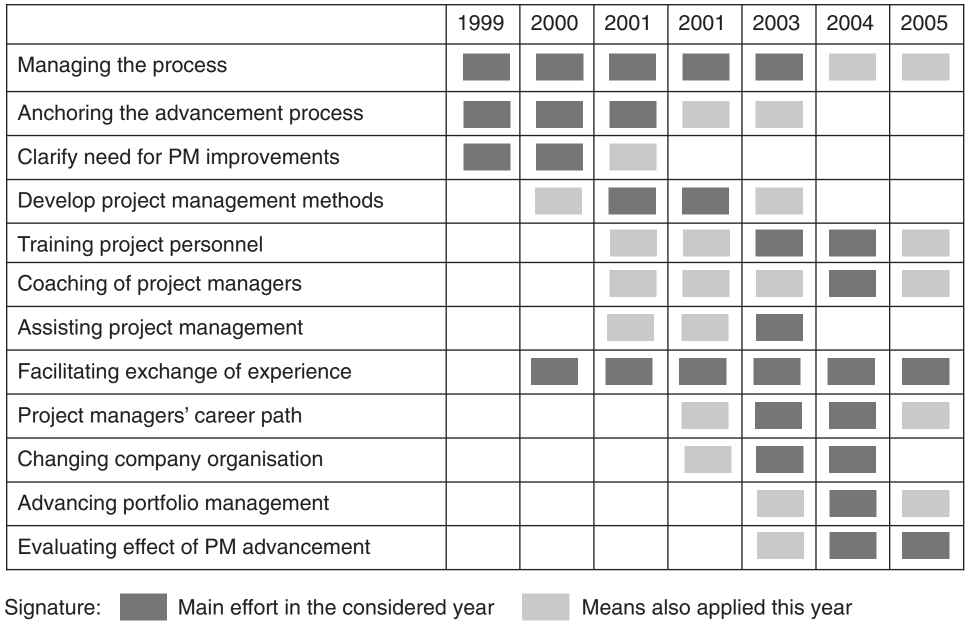

FIGURE 29.2 The process of advancing project management at the Danish Defence Air Force Materiel Command—in reference to the 12 instruments of improvement, demonstrating how the focus has changed during the process.

- Top management anchoring was secured through a strong command decision-making process.
- A first workshop was initiated, and the top management anchoring was demonstrated for the employees by one of the commanding officers.
- The continued commitment and determination of commanding officers was demonstrated by the full participation of all commanding officers at the closing workshop.
- Anchoring among the employees was further ensured by organizing four workshops with the core group as an active dialogue tool.
- An incremental number of selected advancement instruments were applied per period of the process.
- Visible improvements of project management were early targets in the process.
- Employees were able to relate to a concrete product (a guideline).

3. Clarifying Need for Advancement

The first development workshop was dedicated to reassessment of the planned development objectives in close cooperation with participants from the entire organization. Later in the process, these objectives were again evaluated, which led to a considerable change of focus.

4. Developing Project Management Methods

The collective project experience in the organization was captured during the workshops and transformed into a project management guideline with recommended methods. It is important to note that this guideline is *not* a compilation of rules, but simply guidance. You do not have to follow it strictly *if* you have good arguments for differing.

5. Training Project Personnel

The training aspect has not been one of the prioritized instruments, but we did use the following:

- General training of the project participants in external courses
- Participation of key employees in a broad range of courses and seminars to gain inspiration
- Utilization of the four workshops as partial sources of training

6. Coaching of Project Managers

A number of current projects in the organization were treated as project management cases during the development process. The aim was to derive benefits for both the project managers and the development process from such cooperation. Unfortunately, this part of the process was not a success. However, it was determined that a more systematic coaching of the project managers would have been useful for everyone.

One important theme during the entire advancement process has been to promote focus on conscious project *management*—not only on project *execution* issues. So, the most important task when coaching the project managers is to keep the management aspects in focus.

7. Assisting Project Management

The advancement process has demonstrated that the facilitator role is important and that it certainly will be profitable to allocate facilitation assistance in coming projects when organizing preparation and start-up workshops.

8. Facilitating Exchange of Experience

The entire process has focused on capturing project management experience and sharing know-how. Once more, our experience is that the applied concept with a series of workshops and stimulation of open dialogue was very powerful.

9. Project Managers' Career Paths

The advancement effort has also led to a growing understanding in the organization regarding project management as a career path and, in addition, that the heavy project manager assignments can (and should) be separated from ongoing line management roles.

10. Changing Company Organization

In parallel to the process on project management, a new portfolio management structure has been implemented in the AMC with the aim of avoiding individual steering committees. Instead, steering committees have been established for seven areas of air defense materiel, with each committee directing a number of projects. Above these "materiel steering committees," we have established a materiel coordination committee.

We also find it necessary to employ a permanent competence center for project management in order to continue the advancement of project management.

11. Advancing Portfolio Management

The structure of the materiel coordination committee and the seven materiel steering committees is aimed at strengthening portfolio management and has until now led to considerably increased focus on the portfolio management. This includes easing the priority settings among the specific projects.

12. Evaluating Effect of PM Advancement

Before the advancement process was initiated, an evaluation of the project management maturity level in the organization was considered, but, at the time, no immediately applicable tool was available.

Assessment of the effects and gained benefits were consequently based on a subjective validation in which we were missing a factual basis for proving all the improvements.

CASE 2: IMPROVED PROJECT MANAGEMENT AT SIEMENS A/S DENMARK

Henning Skovhøj, Project Director, Siemens, A/S Denmark

Project management of investment projects within the areas of Energy, Industry, IT and Telecommunication, Medico and Traffic has been part of Siemens' main business for many years.

1. Managing the Advancement Process

Since 1995, the organization has dealt with the development of competencies in project management at the professional level as strategic focus areas. After seven years of intensive work, many objectives have been reached, but at least as many remain to be accomplished. You might ask yourself, is this lag in results the consequence of slow progress toward adjustment as a project-based organization, or has the organization strengthened its demands as a consequence of market conditions? The answer is a combination of both aspects.

Experience shows that successive advancements of competencies in project management are needed at both the project level and the organization level.

One of Siemens' core values is *change*. If you want to exert influence on development, you must also possess the capability and the determination to implement changes swiftly and efficiently. In connection with implementation of ISO 9001 quality control at the beginning of the 1990s, focus was on coherent business processes with related tolls called *project's life cycle.* The need to distinguish between managing and leading a project had been realized earlier, but ISO 9001 led to understanding the importance of managing business processes in a structured and uniform way. Project management professionalism then became a focus area.

The most important initiatives toward a project-based organization came in 1998 as the result of a process focused on business process reengineering (BPR). The process, which was performed jointly for three important divisions, led, among other things, to establishment of a project management office (PMO) as an independent unit. This project office became the supplier of project management to all divisions in Siemens.

The diagram in Figure 29.3 demonstrates application of the 12 instruments have varied during the entire advancement process.

2. Anchoring the Advancement Initiatives

The strategic development of project management initiatives was anchored in a project manager steering committee including representatives from all divisions. The aim was to promote a broad base for competencies development throughout the project-based sector of the organization.

3. Clarifying Need for Advancement

Before establishment of the project management office (PMO), the responsible sales manager typically served as project manager, and at the same time was responsible for services to the client. Only major projects had their own independent project manager and steering committee. This constellation often caused problems in professional execution of all the disciplines involved. An alternative task distribution was necessary, but how should it be organized?

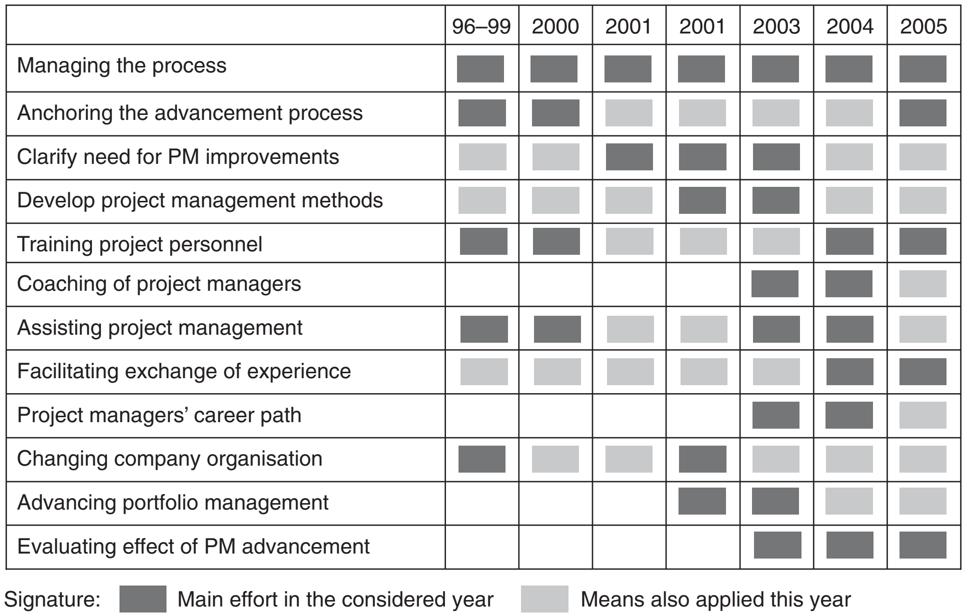

FIGURE 29.3 The process of advancing project management at Siemens A/S Denmark—in reference to the 12 instruments of improvement, demonstrating how the focus has changed during the process.

As part of identifying an efficient and operational task distribution, the results from an employee satisfaction analysis were utilized. The best ideas and needs descriptions very often come from the employees. Further, feeling their own influence gives the employees extra motivation for contributing to the advancement, an essential consideration when dealing with organizational development issues.

While it is good to develop your own company ideas, it is also wise to benefit from the experience of others. Consequently, benchmarking toward achievement of a project management culture in other organizations was performed as part of the change process. One of the conclusions reached was to consider a project manager to be *managing director for the project*—which also underlines the unambiguous project responsibility.

4. Developing Project Management Methods

Part of the effort toward a project-based organization was to develop a tool box encompassing joint project management tools.

When implementing ISO 9001, we had established a set of quality manuals with primary focus on uniformity in document handling and filing. However, to support the goal of professional project management, additional tools were needed. Further, a project model with focus on the project processes had to be determined.

The uniform models and tools provided the platform for efficient handling of projects. The tools include homogeneous calculation principles, project analyses, review, and electronic databases, with related tools for handling of project changes, problems, and risks. The finance control system, SAP R3, including the project control module, was also implemented.

As part of developing a common project management culture in Siemens, a project management model—PROMIS (Project Management in Siemens)—has been created. The model includes all phases from offer/initiation to project closing, and is designed with a view to current market requirements.

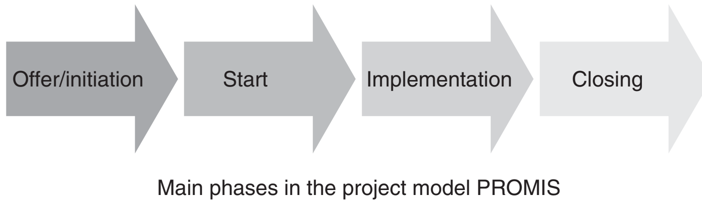

FIGURE 29.4 Main phases of the project management model PROMIS at Siemens

Further, as an extension to the SAP R3 project control module, Siemens has implemented a quality master system which automatically generates graphic project reports with focus on deviation reports. This and other relevant project control tools are being applied through the PROMIS project control guidelines at Siemens.

5. Training Project Personnel

It is essential for achieve a common project culture in an organization to establish a common understanding of the project management concept. A first step was to initiate cultural training in project management. The consultants at the company, Connector A/S, were trainers and sparring partners in this process. We accomplished broad basic training of salesmen, project managers, key participants, project directors, line managers, steering group members, and the entire management.

The next step has been to transform this training into practice. If you do not take significant initiatives for process changes, it is quite human to stick to normal procedure. So it is essential to make the organization understand and follow the new guidelines. So far, Siemens has succeeded. But the training effort did not stop here.

Siemens Project Academy (SPA) was established to anchor a future training concept. Activities and courses were organized to prepare our line managers, project managers, and project participants to handle projects—corresponding to the IPMA Certification Level C and Level B, respectively.

During the recent seven years, approximately 600–700 employees have completed one of the project manager training modules.

Recently, Siemens, for the whole of Scandinavia, has established close cooperation concerning the advancement of project management. This effort also includes a common project management model. Further, a new and revised Siemens Project Academy is under preparation to establish common project manager training within Siemens in Scandinavia.

6. Coaching of Project Managers

For selected business areas, a process coach has been appointed who functions as facilitator in connection with exchange of experience and *best practice sharing*.

7. Assisting Project Management

Project managers were supposed to call in to participate in a "voluntary" project review. This plan did not function, and, therefore, additional advancement effort has been focused on this area.

8. Facilitating Exchange of Experience

An important instrument for streamlining project management is to exchange experience across the projects. Consequently, we organized late afternoon meetings in which various project management topics have been debated in a broad forum. These meetings were more or less replaced later by theme meetings with special focus on *best practice sharing.* Additionally, for selected business areas, we have appointed a process coach who functions as facilitator for the exchange of experience.

9. Project Managers' Career Paths

The management in Siemens wants to establish a career path for the project managers. As the organization becomes more and more project-based, it is necessary to make project management visible as a career path. In this way, Siemens expects to maintain the competencies in a project-oriented direction—instead of simply having a line management track as career path.

10. Changing Company Organization

Siemens focuses generally on project management. The German parent company introduces its internal project management worldwide as PM@Siemens. Siemens Denmark actively participates in this work and stands among the leading countries within the project management area.

11. Advancing Portfolio Management

In contrast to arranging exclusive steering committee meetings per project, more and more project portfolio steering committees are being established within specific business areas. This results in an improved *best practice sharing* as well as improved coordination between the projects.

12. Evaluating Effect of PM Advancement

Measuring and assessing the effect of a process on changing culture is difficult, but competencies development within project management has led to a far greater consciousness and focus on the financial results of the projects. Deviation from the plan and budget is recognized very early in the project life cycle, and project responsibility is now well-defined.

An extra benefit, which has been catalyzed by the project managers, has been much closer cooperation between the business divisions.

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CHAPTER 30

MANAGEMENT BY PROJECT OF THE FAST-GROWING ORGANIZATION IN DYNAMIC ENVIRONMENT

Sergey Bushuyev

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Since 1975, Dr. Bushuyev has prepared 20 candidates for Science (PhD) and Doctor of Science degrees in Development Information Management Systems and Project Management. Since 1996 he has been responsible for preparing more than 600 candidates for Master of Science degrees in Project Management. Recipient of an award as the best professor of Ukraine in 1987, Professor Bushuyev can be contacted at SBushuyev@ukr.net.

30.1 INTRODUCTION

Organization development programs are created and implemented by almost all companies operating in a competitive environment. Creation of effective methodologies of organizational development management is one of the important factors of practical application of project approach activation. Existing models, methods, and mechanisms of organizational development program management were usually based on weakly formalized practices and do not allow for building effective processes of proactive management of organization growth in a competitive dynamic environment.[1]

Proactive management of organization development projects and programs defines a system of models, methods, and mechanisms of program forming based on visions built in terms of the organization (business) life cycle model, synchronized with the life cycles of products being promoted and the development of mechanisms and tools that provide fast, stable organization growth during innovative strategy implication. Proactive management is defined by the presence of active elements that form energy potential of a project, forecast model of organization development life cycle by phases (including critical points), and a model of balanced development by levels: product, technology, management, and business.

Currently, mechanisms of proactive management of development programs are built “on a hunch,” without the necessary methodology support. Methodology of proactive management of organizational development programs is based on complex organizational development models, new product promotion, and shift of technologies, management and business systems, personal motivation, and management styles, and so on. Also, life cycle models carry out the role of navigation structures, and the development model[2] defines basic integrated program strategy that provides forming of organization and stakeholders’ maturity. In real practice such interaction is formed only upon experience, which yields numerous problems in management and goal achievement. It provokes significant quality issues with project management processes and crisis in implicating organizational development projects.

30.2 MODERN ORGANIZATION DEVELOPMENT MODELS

In the 1960s, the suggestion was to consider an organization in terms of a “personality,” and organization development began to be compared with human development. It was suggested that organizations, like humans and plants, have a life-cycle whereby organizations overtime change from green, flexible mechanisms to maturity. This aging process for organizations may result over two or three decades, but they may survive for many more years. This suggests that organizations, like humans, live and develop according the their inner psychological laws. If we follow the logic of this assumption further on we can presume that during their development, organizations overcome crises while transitioning to new development stages to flourish and finally perish. It is also suitable to use a metaphor: “. . . looking on another enterprise: it is three years old, but it is as an old person—decrepit management, apathetic employees, nobody needs anything. . . . ” The conclusion is that all organizations are unique in their development and that the psychological age of an organization could significantly vary from its physical one. A recent survey suggested that the “death-rate” of organizations has greatly increased nowadays.[3]

Western literature during the 1960–1990 period considers “organizations’ life cycles.” *Organization development stages* are periods of an organization’s life bound by value sets of the same type that fix management tasks peculiarities, that are given the attention of top management. Periods during which an organization essentially changes its values and orientation are called *cycles* or *phases* of organization development.

At least 10 models of organization development that were created in different periods of time (1970–1990) still exist today. It is interesting that all 10 models were created in the United States between 1967 and 1983. Each of these models proposes different reasons for change. We will look briefly at each of them and their creators according to the chronology of their creation.

1. *A. Down: "Moving Forces of Growth" (1967).* This is one of the earliest models that appeared by the example of governmental committees. After defining four types of committee occurrence, Down proposed three main growth and development stages of organization. The first stage is the *struggle for autonomy.* It occurs before formal birth or right after it. It is described by the aspiration to earn legitimacy and necessary resources from the environment to reach a "survival threshold." The second stage is *rapid growth.* It includes fast extension, where innovativeness and creativity are emphasized. Finally, the third stage is *retarded.* It is described by rectification and formalization of rules and procedures. Briefly, this model represents the development of governmental organizations from their feasibility assurance to innovations and extension, and finally to formalization and control.

2. *G. Lippitt and U. Schmidt: "Administrative Participation" (1967).* Lippitt and Schmidt developed one of the first life-cycle models of an organization that works in the private sector. They suggested that corporations go through three stages of development:

1. Birth: creation of management systems and achievement of survivability
2. Youth: reputation and stability reinforcement
3. Maturity: achievement of uniqueness and ability to adapt to altering work areas

This model describes six main tasks of management that change from stage to stage.

3. *B. Scott: "Strategy and Structure" (1971).* This model describes three separate organization types, which follow in historical sequence. Scott states that enterprises develop from informal (he calls it "one man show") to formalized bureaucracy, and then to different industry conglomerates.

4. *L. Greiner: "Leadership Problem on Evolution and Revolution Stages" (1972).* The main precondition for creation of this theory was that the future of an organization is defined by its organizational history more than by external forces. To prove it L. Greiner involves European psychologist theory, which states that behavior is defined by previous events and not the future. By transferring this analogy onto organizational development, he discusses the number of stages that must be passed by developing companies. Thus, organization life consists of evolving through stages where each evolution period creates its own revolution. Revolution is a rough period in organization development that requires a thorough review of management methods. The transition of organization from one stage to another comes through overcoming an according crisis.

5. *W. Torbert: "Organization Members Mentality" (1974).* In this model, organizational development is closely related to developing feelings of personnel solidarity. Development happens from individuality and diffusiveness of groups to the feeling of collective belonging and participation. However, the development mechanisms are not detailed.

6. *F. Leeden: "Functional Problems" (1975).* In various stages of development, organizations have different functional problems—environmental adaptation, resource acquisition, goal achievement, and behavior patterns maintenance. The first focus of a new organization, according to Leeden, is adaptation and conquest of its niche in dynamic environment. It is achieved mainly through innovations. The second focus is resource acquisition and development of procedures' working methods. The third thing to focus on is a goal statement and profit earning. The fourth stage pays attention to maintenance of behavioral patterns and structures institutionalizing.

7. *D. Katz and R. Kahn: "Organizational Structure" (1978).* These researchers built their own organization development model based on thorough organizational chart development, and according to it they proposed three main development stages: simple systems stage, stable organization stage, and structures development stage. After publishing this paper, social organizations were considered as "open" systems, which are characterized by their interaction with environment. The main preconditions of organization success are looked at not from within but from outside of it. The understanding that the organizations represent complex open systems consisting of several interconnected subsystems performs the function of the methodology principle of organizing and analyzing data acquired during diagnostics of a particular organization.

8. *I. Adizes: "Organization Life Cycle Theory" (1979).* This model is an evolutionary-teleological model of organizational development that considers a given process as some kind of analogy to biological organism development. Organization development process is represented as natural, staged, and preprogrammed, providing inevitable and stage-by-stage passage of a number of obligatory phases (stages) during its development. The concept phase is impossible to skip to the next phases. His theory is focused on two most important aspects of survivability of organization, which are flexibility and manageability.

9. *J. Kimberley: "External Social Control, Work Structure, and Environment Relations" (1979).* Studying the creation and development of medical schools allowed Kimberley to create a principally different model of organization development. He claims that the first identifiable stage occurs before actual creation of the organization. In this stage resources are being aligned and future ideology formed. All this implies transition onto a second developmental stage that includes choosing "main transition schemes" (i.e., personnel hiring). The third stage includes forming the organizational identity. In the fourth stage, rules become more rigid, structured, formulated, and organization becomes more conservative and predictable in response to environmental pressure.

10. *R. Quinn and K. Cameron: "Integrative Model" (1983).* In 1983, Quinn and Cameron proposed an option generalizing all the previous models. The main emphasis in their allocation of four stages is put to effectiveness of the organization's operations and its criteria on different stages.

30.3 UNIVERSAL MODEL OF ORGANIZATIONAL DEVELOPMENT PROJECTS AND PROGRAMS MANAGEMENT

Let us consider one of the possible points of view on integrated model and organizational development projects management methodology.

A model of how vision is formed during a project's (program's) birth is given in Figure 30.1.

This scheme highlights three sources of birth for projects and programs—*a problem, a challenge, and a mission* of organization. These sources are tightly related, and this relation makes the genetic

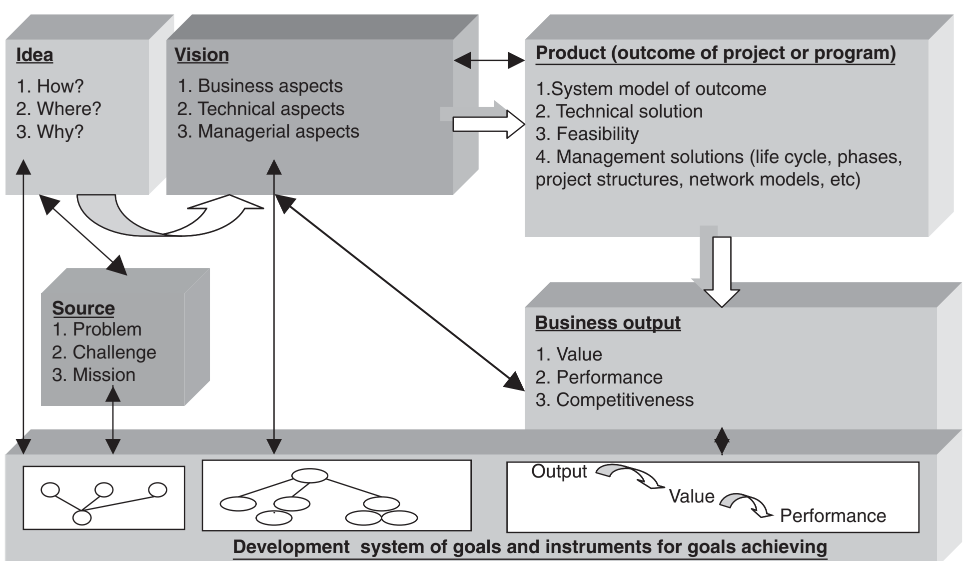

FIGURE 30.1 Forming of vision during birth of projects (programs).

code of a project more complicated. By the term *genetic code* of a project (program), we understand the systematic model of a project and this model includes basic understanding of the project's product vision, tools of project's interaction with the environment and integral development process in a specific subject area, which are built for the entire project life cycle. During project implementation its genetic code may be altered under the influence of changes and the development of the project product, management processes, and environment interaction knowledge systems.

Modern science and practice developed a number of approaches used in projects and programs management systems. Each of them has its own place in a general model and PM methodology. These approaches include the following:

- Systems
- Project
- Process
- Scenario

Let us consider one of the possible points of view on integrated model and PM methodology.

We shall start with systems approach. This approach allows us to consider the project as a set of interconnected elements—a system that lives in a dynamically changing environment. Environment changes itself under the influence of a given project and also independently of it. On this level, the most important things are the questions of project birth and its environment interaction.

The birth of projects in companies is based upon a life cycle interaction philosophy. A multilayer model of developing organization with highlights of project birth locations is presented in Figure 30.2. The directions on which a process of organization development is based—a system of constant improvements and a reengineering system, both of which are bound by a philosophy of interaction of life cycles of product, process, management system, and the business itself—is presented in Figure 30.2.

Now we will examine main approaches used in modern project management methodologies and their logical relation: systems approach, project approach, process approach, and scenario approach.

Systems approach is characterized by the full systematic look on a project or a program. Tools and methods of goal placement and goal achievement in systems approach are not developed.

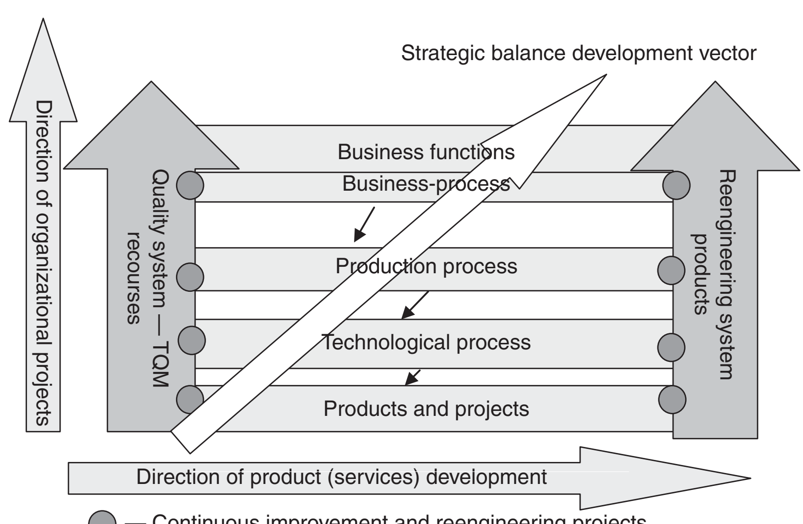

FIGURE 30.2 Multilayer model of organization and locations of project birth.

Project approach is characterized by clear orientation on goal achievement—creation of the*project product.* Tools of project and program management are built with respect to project or program uniqueness and to provide goal achievement in the given criteria system. If we choose *hierarchy* as a model of interaction of these approaches, then a project approach is encapsulated into a systems approach, and methodology of approaches interaction may be represented as *nested.*

Process approach is related with the necessity to regulate and unify actions of project managers, to bring them to repeating processes with description of inbound and outbound parameters (resources), and a set of actions that transform input into output. Process approach binds itself to a specific subject area (construction, IT, and so on) and allows us to formalize actions of a project manager. In the Nested Model, process approach is encapsulated into project approach, and the regulatory document that describes relations between approaches is called the Project Management Operations Manual.

Scenario approach is related with processes of decision preparation and decision making in project management. Scenarios provide fast transition of best practices into various project management processes. Scenario approach is thus enclosed into process approach and it finishes forming the Nested Model of project management approaches (Figure 30.3).

The proposed model allows building and developing various formal and informal methodologies of project management. Thus, it is necessary to consider the influence of project implementation subject area knowledge and regulations along with the influence of administrative management culture of organization. In this case, the main load on integration is placed on a systems approach and the tools for organizing interaction between three components: subject, administrative, and project.

The interaction of different approaches in the process of project management is related, first of all, with goal placement and goal achievement systems that are subject to changes during the development of technological maturity of management teams and the organization itself. And thus during project implementation different goal achievement models are considered in the context of “systems integrators” while managing projects. In real practice such interaction is formed on a hunch, which yields a significant amount of problems in change management and goal achievement. It provokes significant quality issues with project management processes and crises in the implication of projects.

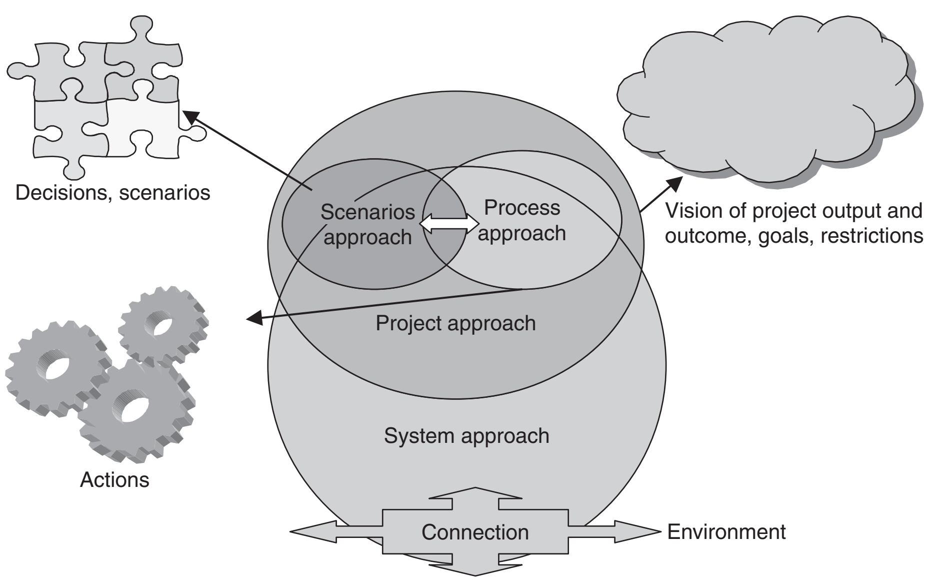

FIGURE 30.3 Nested Model of approaches interaction in the methodology of projects and programs management.

Process and scenario approaches are interconnected subsystems, in terms of this they could be represented as integrated processes that lead to the necessity of particular scenarios selection, and these scenarios in turn may contain chains of project management processes inside.

30.4 SYSTEMS MODEL OF PROACTIVE MANAGEMENT OF ORGANIZATIONAL DEVELOPMENT PROGRAMS

Let us consider a simplified roadmap of centers of proactive organizational development programs management (Figure 30.4). This map considers an organization as an active system with the centers of expenditures, power, responsibility, resource provision (including finance), activity, energy, and so on. Each of these centers has a particular potential that is used and considered in management processes.

The model that depicts activity dynamics and potential of each center according to the organization's life cycle[4] serves to clearly define a vision of organizational development projects, which make the complete program. The potential of the center is considered its generalized characteristic. The processes of managing stand-alone projects of organizational development are based on a model of balanced development[3] and rectified models of vision by horizons (including bifurcation points) of business development, management systems, technologies, and products.

Considering the model allows us to build and develop various formal and informal project management methodologies. Thus, it is necessary to consider the influence of project implementation in subject area knowledge and regulations, and also the influence of administrative management

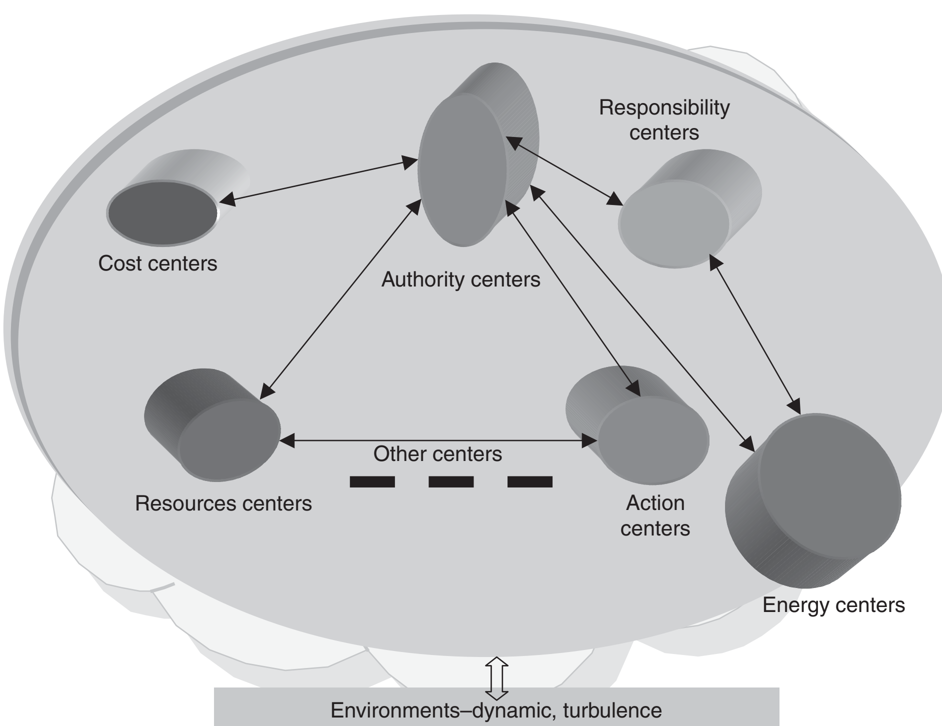

FIGURE 30.4 Centers of model of proactive management of organizational development programs.

culture of organization. In this case, the main emphasis on all centers of integration is placed on systems approach and the tools for organizing interaction between three components—subject area, administrative, and project systems of proactive management.

The following lists the models of projects and programs in vision forming:

- Fog
- Cloud
- Horizon
- Telescope
- Pyramid

Selection of one of these models depends on subject area and knowledge about project product, its result, and the project itself.

Let us consider the elements of vision models and characteristics of their application in practice of proactive management (Figure 30.5)

The following list gives the structure of goals vision:

- Business goals:
  - Business result (performance)
  - Interaction with business environment
  - Business requirements
- Technical chains:
  - Concept solutions
  - Technical requirements

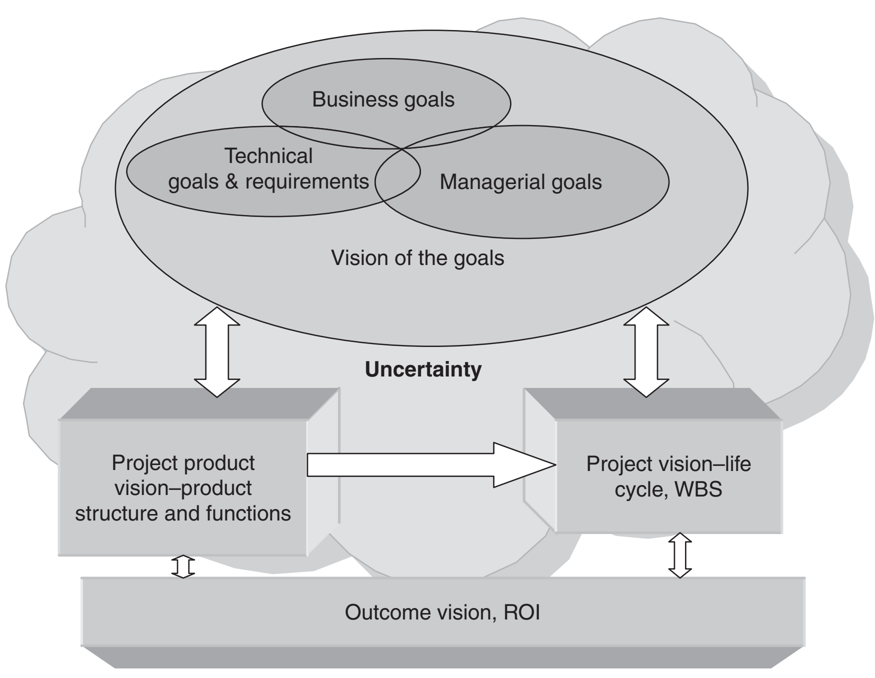

FIGURE 30.5 Structure of project (program) vision model.

- Management chains:
  - Time
  - Money
  - Quality
  - Resources

Basic characteristics of vision models from the point of view of project and program management are given in Table 30.1.

Figure 30.6 shows the organization life cycle model with bifurcation points in the development processes.

Within the limits of proactive management on the model of organization development model life cycle, the necessary organizational changes for each bifurcation point are defined. Thus, the development program is formed according to the evaluated duration of each of the projects and the latest term of its completion, bound to a specific bifurcation point. Obviously, during the process of program preparation, interconnected project chains are formed by specific vision horizons. Thus, on each step we rectify the project's vision and their time synchronization.

TABLE 30.1 Vision Models Characteristics

Vision model	Product and result	Application area	Strategy
Fog	Separate elements' silhouettes are visible *Shape of the system cannot be seen*	Innovative projects R&D projects	Blind movement by touch Step-by-step scheme of vision and goal achievement forming Work with high risks and changes The most important is to know when to stop
Cloud	Product and result silhouettes are visible System elements are practically invisible	Organization restructuring and development	Movement toward the Cloud Step-by-step scheme of vision and goal achievement forming Work with high risks and changes Swift reaction on vision specification
Horizon	Product silhouettes are visible on the horizon Shape of the final system cannot be seen	Project with far perspective of result acquirement	Movement toward the Horizon Step-by-step scheme of vision and goal achievement forming Work with high risks and changes Effective expectations management
Telescope	Silhouettes of specific elements could be seen Shape of the whole system is fuzzy	Projects with complex scope and management processes	Allocation of aspects of the analysis Step-by-step scheme of vision and goal achievement forming on each aspect and in whole Systems integration of vision and wholeness of the project
Pyramid	Separate edges can be seen A number of edges cannot be seen	Organization and business development projects	Clarification of vision on edges that cannot be seen Consideration of risks of insufficient vision of project product and goal achievement Swift reaction on vision specification

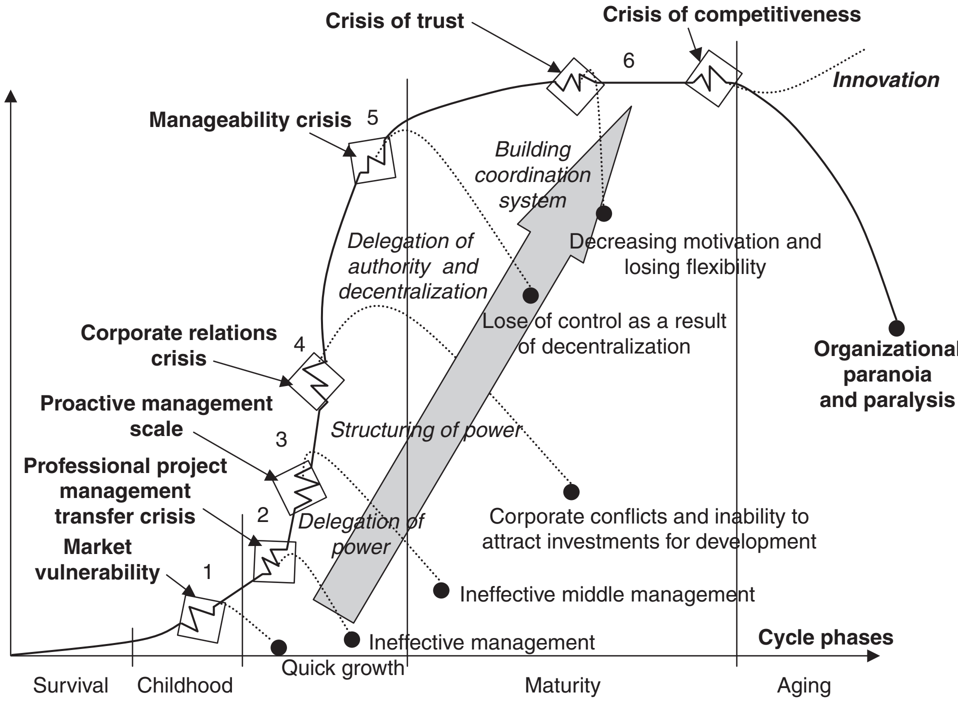

FIGURE 30.6 Organizational life cycle model.

30.5 MODERN TOOLS OF GOAL PLACEMENT AND GOAL ACHIEVEMENT IN ORGANIZATIONAL DEVELOPMENT PROJECT MANAGEMENT

Top management of the organization should form a project vision—realize its value and scope. The source of development for the project goal system, and accordingly for goal achievement tools, is project vision. For project success all its members should know that management completely approves this project, it has high priority, and its success is directly connected with the future of the organization. From all of this we can make the conclusion that the project goal system should be developed in the context of organization development. The goal system demands are shown in the SMART approach:

- **Specific**—for realization of project progress, team behavior or team managers influence
- **Measurable**—defined for possibility of Result achievement level and project progress evaluation
- **Achievable**—realistic, understandable, and achievable, stimulating the wish to achieve goals
- **Result** oriented—connected with defined products and results of its realization
- **Time** specific—limited in time for the purpose of tracking of result achievement progress

One of the simplest project or program progress models is shown in Figure 30.7. Input influence is shown like a project vision where information about the project product, project result, goals, and key limitations is concentrated. The project transforms vision to reality and getting the product and then results as an output. Goal placement and goal achievement system is connected with all the

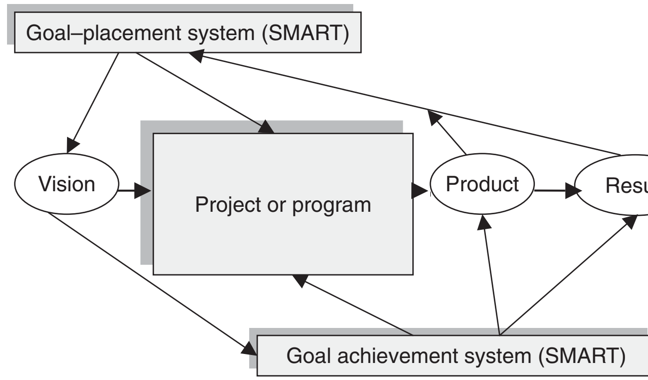

FIGURE 30.7 Process model of project goal achieving.

relevant information from vision. Basic project «Vision» elements define project charter. During the project the vision is usually approximated or changed.

The balanced scorecard (BSC)[8] is system modeling integrated processes of goal-placement and goal achieving in the organization.[3] Strategic project management is usually based on the balanced scorecard system; thus, it defines the following:

- Vision, mission, and project goals. Goal tree. Finance goals' relationships with project product realization goals. In this case, goal placement system is working.
- Planning process organization.
- Balanced Scorecard System Conception.
- Projection "Finance": total characteristic, modeling, index selecting approaches.
- Projection "Inside project management processes": total characteristic, modeling, index selecting approaches.
- Projection "Outside environment management and project collaboration": total characteristic, modeling, index selecting approaches.
- Projection "Training and Development": total characteristic, modeling, index selecting approaches.
- BSC method characteristic, index modeling, index selecting approaches.
- Organizational (System) project goal achieving Algorithm based on BSC.
- Integration of analysis results based on SWOT (strengths, weaknesses, opportunities, threats) analysis.
- Defining success key factors of project strategy building.
- Defining of cause-effect connections in BSC system.
- Defining specific goals of strategy building and index selecting inside projection limits.
- Development of project realization plan.

The next step of the balance scorecard system development becomes universal score system development. Universal score system[5] builds on the model of continuous Process Improvement (plus development plus training). This model integrates balanced score systems of personality, organization or project, total quality management system, and competence management system of managers. In personnel and organizational development, a mission is defined as a general goal, result vision, key roles, key success factors, objectives, results ratios of goal achieving, goals ratio and actions for goal achievement. In terms of total quality and competence management the Deming and Colb models and the professional competence development cycle are working. The following were the six principles of the universal organization activity scorecard evaluation:

1. User satisfaction orientation
2. Fascinating and pleasant work
3. Business processes orientation
4. Coordinated goals of personality and organization
5. Ethics and behavior, based on facts
6. Attention to long-term improvements, development, and training

It's understandable that the universal scorecard system puts emphasis in the goal system, which is oriented to organization development processes. Thus, project and organization goals very often are in contradiction with themselves in goal achieving system. Effective methods to solve these problems are defined by Organizational maturity, adequate organizational structure, project management methodology, and by the systems of development programs, project portfolio, and project business-processes. The organization's management tasks are connected with conflict forming and maintaining project management processes in constructive ways. We should remember that *conflicts* in this kind of system are considered as a source of inside development. A balanced development platform is shown in Figure 30.8.

The authors propose a balance development card (BDC), which builds business, development, technologies, and production by levels (Figure 30.9). This card shows organizational system dynamics based on balance of product development, management system technologies, and business management systems.

Usage of BDC allows ordering up the organizational development processes, starting from the development philosophy of different organization levels, and innovation platforms that make ordered and ready-to-use nonmaterial assets, and of course the employees. The principal difference of BDC is its base model structure. Thus, in a balanced score system[3] the base model defines the next dimensions: finance, clients, inside processes, and employees. Balanced development cards use the next base model, business, management, production, and products. Balanced development cards are a strategic tool in preparation of organizational development projects and programs. Nevertheless, balanced development cards have a different basic model than strategic cards,[5] which are the basis of the Balanced Scorecards (BSC) technology.

Development on each level is formed upon the business's life cycles philosophy, management systems, production and products technology, innovation systems, integrated informational systems, and organization employees. In development processes there is active implementation of intellectual assets as innovative platforms. Thus, one of the criteria of development program efficiency is the level of intellectual assets capitalizing and transforming into material assets. Collaboration between elements of each level of the balanced development card model is defined by specific production, its business maturity level, development phase, employees' competence, and

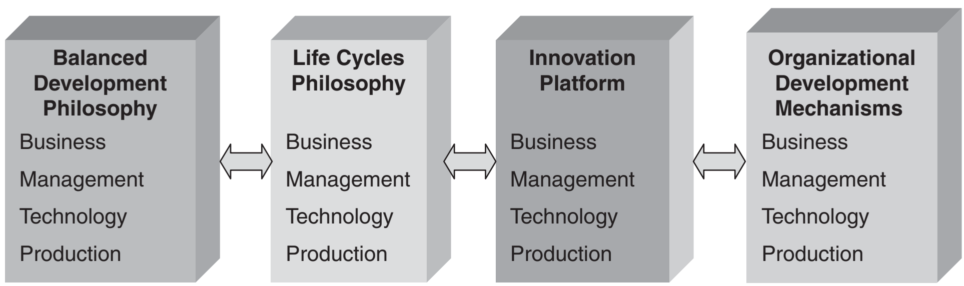

FIGURE 30.8 Balanced development platform.

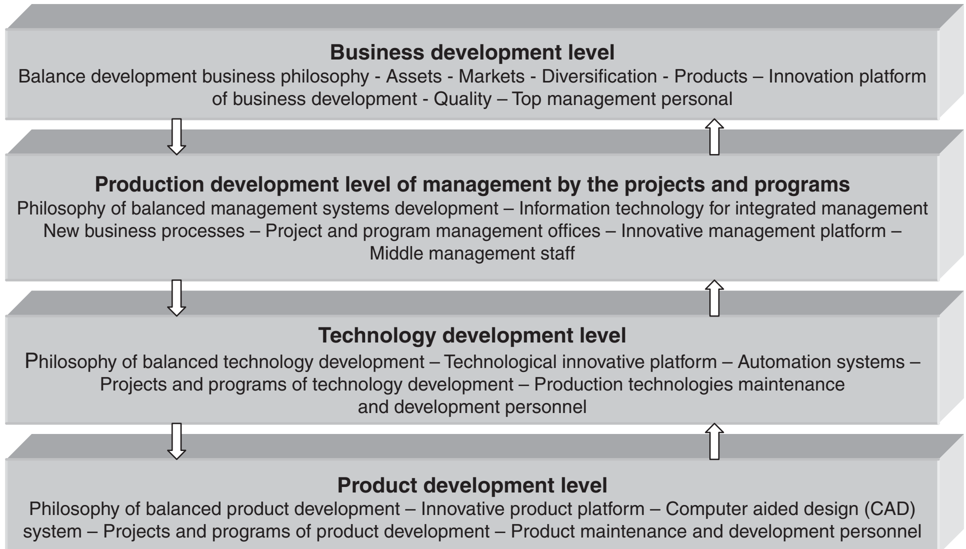

FIGURE 30.9 Balanced development card of organization.

so forth. Based on this collaboration, the balanced development card will be specific for each organization.

It's obvious that the main strategic goal of project and program management governance of the organization is to create balance in its goal system: organization, development programs, project portfolio, separate projects, managers' teams, and separate managers. This kind of balance is built upon cause-effect relations analysis between goals of separate system elements and key success factors approved by the organization on the levels of the organization itself, its strategy, development management teams, project portfolios, and separate projects. The result of such analysis will be a map of cause-effect relations between organization goals in the following context: finance perspective, environment response (customers and other stakeholders), inside business processes development, employee development, and results ratios, including goal ratios for project management. Decomposing the map of cause-effect relations, we build a balanced score system model in the next sequence:

- Chapters (finance, outside environment, inside business processes, and employees)
- Key success factors
- Strategic goals
- Results ratios
- Goal ratios of results ratios
- Planning actions for development

This implies that crossing of BSC and BDC lets us quickly build the matrix model of organizational development program, considering the specifics of functional and project activity. An example of the structure of this kind of matrix is shown in Figure 30.10.

This example shows us that the basic Project 1 initiated as development of new product because we have financial problems or challenges. Project 1 initiated a second wave of projects in the business level finance dimension, improvement of production process on the technological level, and training of product manager of the product level. Improvement of production process initiated the third wave of projects. These projects are improvement in client relationship management system

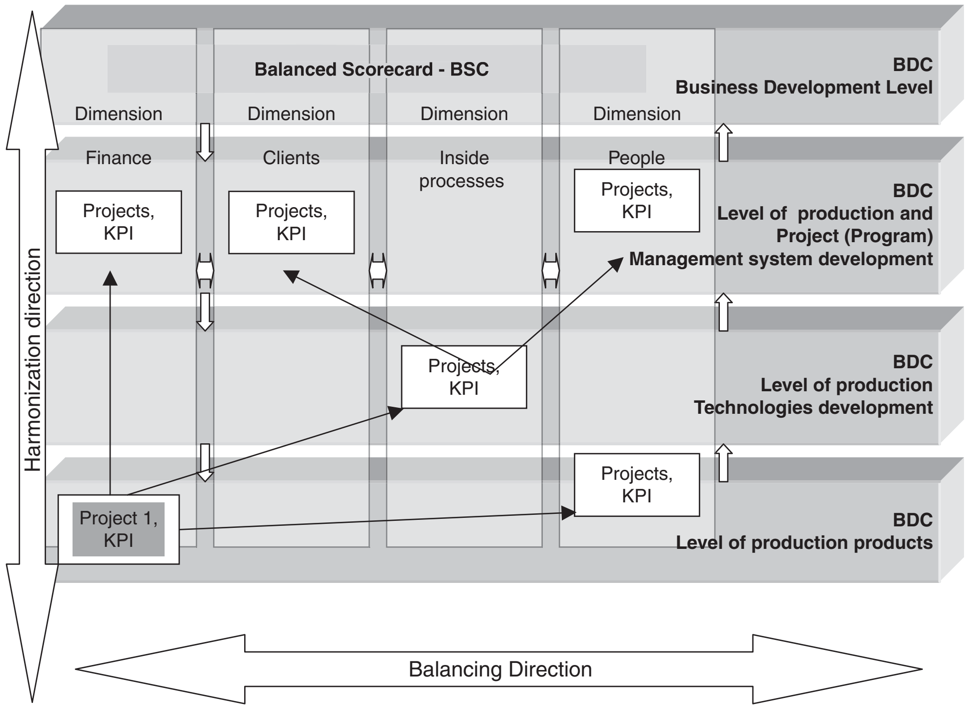

FIGURE 30.10 Matrix of collaboration between balanced score system and organizational development system.

and training the business leaders of organizations. Key performance indicators (KPI) are developed by SMART and used for managing projects.

Table 30.2 defines the main tools of organizational development projects and their bindings to the appropriate bifurcation points.

30.6 MODERN MECHANISMS OF PROACTIVE ORGANIZATIONAL DEVELOPMENT PROGRAM MANAGEMENT

The matrix score system[3] emphasizes goals systems that are oriented toward organization development processes. Thus, project and organization goals very often are in contradiction with them in the goal achievement system. Effective methods of this problems solving defining by organizational maturity, right chosen and built organizational structure, project management methodology, and by the systems of development programs, project portfolio and projects business processes. The organization's management tasks are connected with conflict forming and maintaining the project management processes in a constructive way. We should remember that conflicts in this kind of system are considered a source of inside development.

Obviously, the main strategic goal of project and program management (project governance) is to create balance in the goal system: organization, development program, project portfolio, separate projects, managers' teams, and separate managers. This kind of balance is built upon cause-effect relations analysis between goals of separate system elements and key success factors approved by the organization on the levels of the organization itself, its strategy, development management teams, project portfolios, and separate projects. The result of such analysis will be a map of cause-effect

TABLE 30.2 An Example of Adding an Organizational Project to a Program Based on Proactive Management

Project	Bifurcation points				
	2	3	4	5	6
Organization					
• Organization form (Ltd, JSC, corporation, holding, etc.)	X		X		X
• Management style	X	X	X	X	X
• Organizational structure and functions	X		X		X
• Organizational maturity		X	X	X	X
• Innovation (Creativity) Potential				X	X
• Motivation system	X	X	X	X	X
• Trust forming system		X		X	
• Strategy support system	X		X		X
• Effective Communication system	X	X	X	X	X
Product					
• Product design system (CAD)	X		X		
• Product reengineering		X		X	X
Management system					
• Integrated management system		X		X	
• Marketing	X		X		X
• Logistic		X		X	
• Quality (TQM, 6 sigma)		X		X	
• Ecological monitoring, etc.			X		X

relations between organization goals in the following context: finance perspective, environment response (customers and other stakeholders), inside business process development, employee development, and results ratios, including goal ratios for project management. Decomposing the map of cause-effect relations, we build a balanced score system model in the next sequence:

- Chapters (finance, outside environment, inside business processes, and employees)
- Key success factors
- Strategic goals
- Results ratios
- Goal ratios of results ratios
- Planning actions for development

Basic mechanisms of active systems management are given in "Models and Methods of Organizational Strategic Development from 'Vision' to reality."[3] The main difference between proactive management mechanisms is related with the application of system of the life cycle models for the preparation of organizational development program .

One of the newest and most important mechanisms in organizational level projects is forming and maintaining trust (bifurcation point 6, Figure 30.6). This mechanism should be included as a component in each organizational development project.

The trust factors of project members are divided in the following groups:

- **Institutional**—law system, supplier's organizational culture
- **Cumulative**—professional characteristics, stable reputation, rational service, cooperation experience
- **Partner relationship based**—management process efficiency, result quality, efficiency of activities in dynamic environment and security, efficiency of project product work and profits of the client

TABLE 30.3 Trust-Forming Mechanisms in an Organization's Development

Development mechanism	State of the object during crisis of trust
Employees' Motivation	Persons unready for change who prefer stability Lack of dynamics which were present during past stages; lack of further growth expectation and sometimes even lack of vision for the future: routine, too regulated, system causes decrease of employees' motivation
Employees' Competence Development	Employees are competent, however, lack of business growth might mean a slowdown in acquisition of new knowledge and skills, which in the end may cause knowledge aging.
Effective Teambuilding	Teams built (formed), a big part of conformism exists, people get satisfaction because of team collaboration process, teams become more and more closed subsystems.
Process and Technologies Development	Processes and technologies mostly don't modernize
Optimization of Decision-Making Process Structure	Formalized decision-making roles exist. Decision making by top-down structure. Organization loses its flexibility
Behavior and Creativity Management	Lack of creativity, loss of trust toward organization development programs. Professionals of the organization interested in their competence capitalizing, don't see any potential for future growth in organization
Collaboration with Clients	Stable position at the market organization, less attention is paid to development of CRM programs. Budget of marketing research gets cut to increase organization's profit; low level of market growth expectations
Collaboration with Suppliers (vendors)	"Time-proven" relations are established.
Organizational Climate	Low level of business growth expectations, morale failures, interpersonal relations come to the first stage, employees care less about business. There is no trust in organization's top-management toward production development programs
Organizational Culture	Culture does not help change implementation; moreover, it is an obstacle for further development; "the past" has all the trust while "the future" has no trust at all.
Responsibility Sharing Structure	Authority is concentrated on the top level of hierarchy. Middle level might suffer from authority/responsibility imbalance.
Informational Flows Structure	Vertical dataflow works only as top-down. Bottom-up information is ignored by top management.
Responsibility Area	Result-oriented management, top management is responsible for organization of goal achieving, middle level management for mid- and short-term goals of their divisions.
Management Styles and Methods	Prevailing management style directive
Relationships (interpersonal, intergroup)	The number of conflicts decreased (sociologist Zimmel proves that conflict means not interruption, but is a continuation of social interaction, and often is the only way to save it), close informal relations are in place, and on the intergroup level relations are pretty weak.

30.7 TRUST-FORMING MECHANISMS IN ORGANIZATIONAL DEVELOPMENT

During the maturity phase of an organization's life cycle, the business does not grow. However, that does not say that an organization slows down in its development. Growth and development are equal. In maturity an organization may accumulate energy and potentials, which are necessary to overcome crisis and transition to the more powerful stage of innovation development. Right before trust, a crisis organization is no longer as flexible, as in a growth period, system controlling is maximized.

Further on, we give some examples of mechanisms of organizational development, each of them is necessary in its way for getting out of a crisis. Implementation of these mechanisms is related with the necessity to manage the organization's development based upon complex influence on all of its components.

Table 30.3 gives the list of capabilities used in organizational development projects during trust crisis solving in bifurcation points.

Mechanisms of trust used cognitive maps of trust forming. These mechanisms shown in the following list simplify connection of stakeholders:

- Emotional trust, based on trust categories, roles of involved parts (stakeholders)
- Trust of employee to me (other participants)
- Situational trust
  - social control
  - process control
  - behavioral control
- Trust, based on economical interest

Thus, in the process of employees' trust increasing, participants are highlighted, which gives trust and features risk/opportunity, risk evasion, plus the participants, who receive trust and have loyalty, goodwill, soundness, and openness.

By its nature trust is situational and balances on:

- Situational collaboration
- Situational connections of opportunities and risks

30.8 INFORMATION ASSESSMENT OF ORGANIZATIONAL PROJECTS

In daily management there is a set of standard parameters that management uses in different combinations: financial statements, timeframes, resource pools, quality and specifications, risk issues, and so forth. All of them are of a different nature, and they influence the business in different ways. Nevertheless, management has to have the ability to compare different aspects and parameters while making decisions.[6]

One of the basic assumptions for the following discussion is that the business of the organization occurs in an uncertain and changing environment. From time to time management has to make some decisions to influence the business and find a more optimal and profitable solution or to reach a plan. If all the processes are certain and there are no changes in the environment and scope, then there is no need for managerial decisions, and in some sense there is a little need in management work at all. Hence, the information relates to the uncertainty, contingencies, alternative solutions, and outputs.

There is a strong reason why successful managers can apply their skills in different industries, such as automobiles, computers, telecommunications, and after several years change to a completely new industry like oil and gas—also with success. The core skill of a manager is the ability to process information and make decisions.

30.9 NOTION OF INFORMATION IN ORGANIZATIONAL BUSINESS PROCESSES

For the purposes of this chapter, we consider all the business of the certain organization to be consisting of separate business processes. Some of the business processes are just simple operations, repeating on periodic basis; while some of the business processes are complex projects running for years. Processes can influence one another, and their results are often interdependent or in correlation with one another.

For the moment we can define that all the business B of the organization is a conjunction of its smaller pieces—business processes b_i.

$$B = \{b_i\} \qquad or \qquad B = \cup b_i$$

In this figure, we give the area of Time/Money in the projects of organizational development with respect to incomplete information.

For better understanding of the following explanation we refer to the papers[11] where the notion of information and entropy is introduced in the projects.

For each separate business process or project b_i in the organization, there is a set of possible expected outputs: $\Omega = \{\omega_j\}$. For example, if we only consider time and money (cost or profit) the following picture is possible for each project or business process:

$$\omega_j = \omega(c_j, t_j)$$

There is a probability p of each output: $p(\omega_j)$. $\sum_j p(\omega_j) = 1$

For each individual business process or project b_i we can calculate the entropy:

$$s_i = -\sum_j p(\omega_{ij}) \cdot \ln p(\omega_{ij})$$

This value describes the complexity of the project output; in other words it defines the information required for management to describe the business process or the project.

Following this logic we can define the information describing all the business B of the organization.

$$S = \sum_i s_i = -\sum_i \sum_j p(\omega_{ij}) \cdot \ln p(\omega_{ij})$$

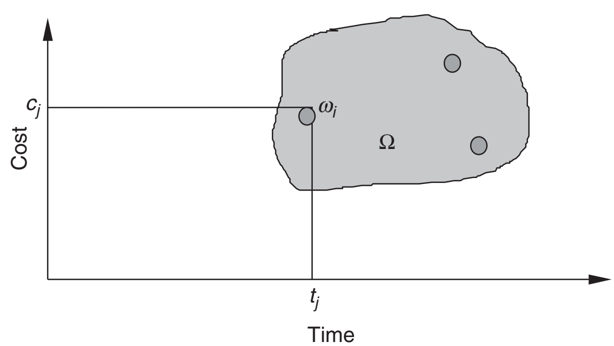

FIGURE 30.11 Possible outputs of organizational project b_i (time and cost).

Those calculations are valid for the case of independent projects. The information of each separate project is summarized and leads to the total information of the organization.

In case of more complex relationships between separate projects and interdependency of outputs, we will use the conditional probability $p(\omega_{ij}|\omega_{kl})$ which defines the probability of output ω_{ij} being the project b_k has the output ω_{kl}. In this case, the equation for the entropy of the project b_i will be:

$$S_i = -\sum_{jkl} p(\omega_{ij}|\omega_{kl})\, p(\omega_{kl}) \ln\left(p(\omega_{ij}|\omega_{kl})\, p(\omega_{kl})\right)$$

To simplify the calculations in this case, it is necessary to "unlink" the projects: regroup them in such a way that all interdependencies are inside one project group, being outputs of project groups are pseudo independent. Design of such management structure and regrouping/organization, which minimize interdependency, allows the following:

- Simplify the management of the organization
- Minimize information/reporting flow

Entropy of the organization in case of dependant projects/business processes is described as follows:

$$S(b_1, b_2, \ldots, b_N) = S(b_1) + S(b_2|b_1) + S(b_3|b_1, b_2) + \cdots + S(b_N|b_1, b_2, \ldots, b_{N-1})$$

where $S(b_j|b_i)$- total relative entropy of project b_j relatively project b_i, that is, entropy of the project b_j, being project b_i is completed and yielded certain output. The measure of mutual dependency of the projects is their mutual information:

$$I_{b_2 \leftrightarrow b_1} = S(b_1) + S(b_2) - (b_1, b_2) \geq 0$$

equality to zero is only reached for independent projects. The measure of information surplus of the project b_i is amount of mutual information about this project contained in other projects: $\tilde{I}_{b_i} = \sum_{\substack{j=1 \\ j \neq i}}^{N} I_{bj \leftrightarrow b_i}$. One can calculate total mutual information using the following formula:

$$I_{b_2 \leftrightarrow b_1} = \sum_i \sum_j P_{ij} \ln \frac{P_{ij}}{p_i r_j}, \quad P_{ij} = P(b_1 \sim \omega_{1i}, b_2 \sim \omega_{2j}), \quad p_i = P(b_1 \sim \omega_{1i}), \quad r_j = P(b_2 \sim \omega_{2j}).$$

We introduce a criterion of surplus information in the organization as follows:

$$\tilde{I}_\Omega = \frac{1}{2} \sum_{i=1}^{N} \sum_{\substack{j=1 \\ j \neq i}}^{N} I_{b_j \leftrightarrow b_i}$$

Problem of minimizing surplus information in the projects of the organization is following: to find out such clustering $B = \{b_i\}$, $i = 1, \ldots, N$, under fixed scope of business Ω and amount of projects N, which will minimize $\tilde{I}_\Omega \rightarrow \min$.

Entropy in each particular project or business process indicates the amount of required information to deal with the uncertainty. In other words, the entropy indicates the required capacity of decision making through the project life cycle.

Notion of information and the quantity of the information in a certain project strongly depends on the scope, representation (way of measure), and accuracy. There is a separate discussion on relevant and irrelevant information, useful information, and those which do not affect the project.

30.10 INFORMATION FLOW IN THE ORGANIZATION

In the previous section, we calculated the total entropy S of the organization, which shows how much information management requires to describe the business of the organization at certain times. Of course, the quantity of information changes with time depending on new projects, progress of old projects, new circumstances, and decisions made for last period.

The changes of the entropy that happened for the period of time due to the external reasons may be described by information flow. The concept of gaining and losing the information will be described in more detail.

In this figure, we give the model of organization that transforms input information including resources into output information including deliverables.

The organization gains information in the following cases:

- The management of the organization gets additional information about the business processes (projects).
- Each particular project becomes more definite, the uncertainty of project output goes down.
- The project b_i is completed, and the management knows exactly the output ω_{ij}^* in this particular case. That also decreases the uncertainty.

This information in-flow decreases the overall entropy S of the organization. We consider the organization to lose information in the following cases:

- The management of the organization realizes the need for additional information concerning certain business processes (projects) because of changes in the scope, additional conditions from the customer, changes on the market, and so forth.
- Disturbance and risk factors influence the project, and uncertainty of the project goes up.
- Management decides to launch a new project b_k, which leads to a new set of possible outputs $\{\omega_{kj}\}$ and increases the overall uncertainty and complexity of the current decision making.

This information out-flow increases the overall entropy S of the Organization.

30.11 THE BASIC LAW OF THE INFORMATION ORGANIZATIONAL MANAGEMENT

Based on the terms described in the previous section, one can draw the following:

$$\Delta S = I_{\text{out}} - I_{\text{in}}$$

This relation holds under the condition that the management of the organization does not make any decisions for the considered time period. In common cases, the above relation gives the following figure (Figure 30.13):

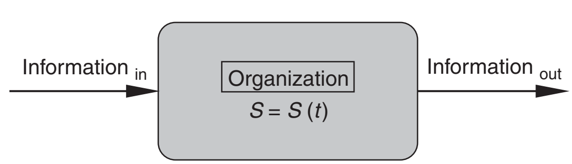

FIGURE 30.12 Information flow in the organization.

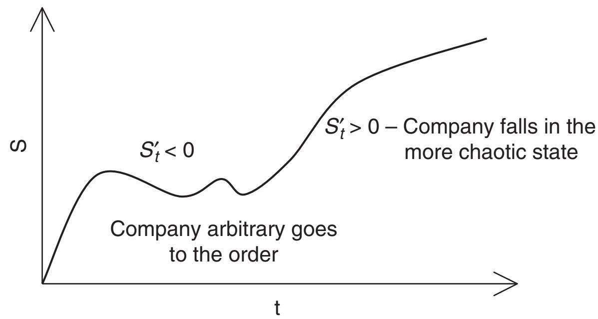

FIGURE 30.13 Sample of entropy behavior.

Such behavior of the entropy shows that along with the average time of the entropy in the system the uncertainty of the situation and the complexity of organization increases.

One can formulate the following lemma: If for the time period $T \geq t_0$ there is no decision making and implementation, then the mean value of the increase of the entropy for this period of time is $\Delta S_T > 0$. Being t_0 - specific minimal time unit in business processes or projects. This lemma holds under the condition of averaging over the ensemble of systems, with the exception of a set of negligible or zero measures.

This corresponds to the second rule of thermodynamics and says that any system as well as an organization with the absence of management falls to a more chaotic state, that is, entropy increases.

Management of the organization makes a decision to do a certain amount of job A to decrease the uncertainty in specific business process, project, or organization. In this case, the equation for balancing entropy, information, and the efforts of the manager making decisions looks like the following:

$$\Delta S + \Delta I + \Delta A = 0$$

This equation represents the basic law of information corporate management. It has a similar sense like a first law of thermodynamics with the following conditions:

$\Delta S > 0$ - Entropy of the system increases, uncertainty goes up

$\Delta I = I_{6x} - I_{6blx} > 0$ - system receives additional information, uncertainty of the system goes down

$\Delta A > 0$ - management does a positive job of decision making, decreasing the uncertainty; uncertainty of the system goes down.

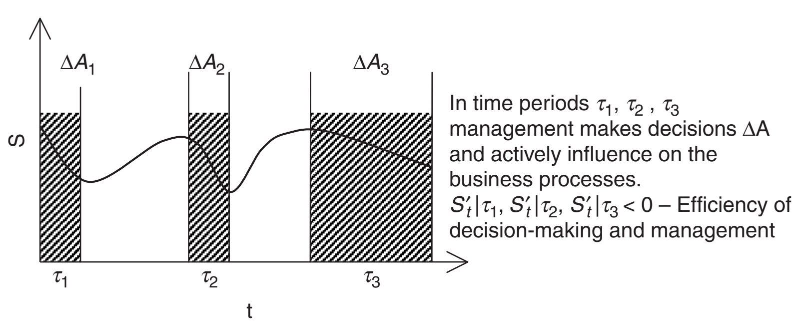

FIGURE 30.14 The behavior of the organization.

30.12 PRESSURE OF CHAOS

We can see the following appropriate rule: if there is a set of possible outputs, and the project manager will not make a decision, then the worst possible output will happen with high probability. In other words, with the aid of the entropy, one can estimate the amount of managerial efforts required to overcome the uncertainty in a particular project. Because less entropy means less managerial effort, and more entropy means that managers have to make more decisions to choose the right way among various alternatives. Entropy in each particular project or business process indicates the amount of required information.

The idea that chaos creates pressure is described in "Entropy Measurement as a Project Control Tool."[7] The article shows how things are falling into a more chaotic state. The entropy of the organization shows the variety of the potential states where the organization could go or potential outputs. In a similar way the second law of thermodynamics shows the direction of the evolution of systems from order to more chaotic states; the same processes apply in the organization. With arbitrary development of the organization, that is, when management does not pay attention to the business and the decision making, the state of the organization has a trend toward chaos.

30.13 ACCURACY OF BUSINESS MONITORING AND THE CAPACITY OF MANAGEMENT

Typically, the main difficulty associated with decision making for management of the organization is connected to the lack or inadequacy of information that management has concerning the issue. The nature of the errors in the information that comes to management is one of the major topics in the theory of active systems where they consider reasons why such errors occur and how to eliminate or minimize their influence on the result.

The decision making in this case is similar to the prediction problem or pattern recognition. Management has to determine certain prediction rules based on the received information, which will allow them to make decisions on certain quantitative or qualitative issues of the business or separate projects. Accuracy or quality of the prediction rule is the error of the prediction Δ. Let's make the following designations: $\Delta = \Delta(f)$, where f – prediction/decision rule, $R = Mean\langle\Psi(\Delta)\rangle$, where R – risk, $\Psi(\Delta)$ - penalty for the fault, $\sigma = \sqrt{\langle\xi^2\rangle}$ - variance of the mistake ξ which is imposed to the management. From[8] the following relationship can be drawn out:

$$R = R_0 + R_1(\sigma)$$

Where R_0 is natural risk even in case of ideal decision making based on the fully relevant and correct information.

This allows us to introduce the notion of the *accuracy of business monitoring* as follows: With the fixed reward/penalty function, $\Psi^*(\Delta)$ under the fixed set of decision rules $\{f\}^*$ (which is determined by the structure of the organization, business, and decision methods)—it is necessary to determine such an accuracy σ^*, which provides that risk R is not greater than maximal allowed value R_{max}. The value σ^* we will call the *accuracy of business monitoring*.

Complexity of business or organizational projects and the entropy depends on the accuracy of business monitoring: $S = S[\sigma(R_{max})]$. It means that the more accurate decision making we demand, the more complex the system becomes. The derivative $\partial S/\partial t$ of the entropy shows how the complexity is distributed over the time and, correspondingly, how many decisions management should make during one time unit.

$$S'_t = S'_t[\sigma(R_{max})]$$

Let's consider the ability of the management to make decisions. Designate $N = Max_T[\partial A/\partial t]$—maximum possible rate of decision making by management system. We will call N – the *capacity of the management system*. It shows how many relevant decisions the management system of the organization can make per unit of time, assuming management is doing its best. There are well-known methods of increasing the capacity of the management system of an organization, for instance:

- Hiring high professional managers, permanent education of the staff
- Building up optimal organizational structure of the organization, information flows, efficient models of business processes
- Implementation of modern management methods and tools, like information technology, decision support systems, and so forth

In any case, the increase of the management capacity is connected with certain expenditures. For example, modern corporations spend 2–2.5 percent of their revenue for information technologies, hire expensive consulting companies for the investigation of the organization and implementation of corporate management system, and invite first-class top managers with salaries of a few million dollars a year.

Let's designate $N = N(C)$ – dependency of the capacity of the management system from the money spent to build it up and maintain, that is, C – is the cost of the management system. Profit of the organization is $P = P_0 - C - R$, where P_0 – is marginal profit with no expenses for the management system. With fixed business conditions, maximizing profit is allowed by minimizing the expenses and risk: $C + R \to \min$.

To the above minimizing problem, one should add another condition: To save the balance of the manageability, the following must hold: $N \geq S'_t$. If this condition will be violated, then it might happen that the management of the organization would not be able to manage properly. That is, the number of questions, which necessarily must be considered and solved, will be greater than what management in principle is capable of solving per time unit. This means that losses due to lost profit or expenses to cover the consequences of risk will be so high, the organization will lose its stability, and there will be no possibility to put it back to normal operations.

Summarizing the above we have the following minimizing problem:

$$\begin{cases} R_{\max} + C \to \min \\ N(C) \geq S'_t\,[\sigma(R_{\max})] \end{cases}$$

30.14 CONCLUSION

Considered mechanisms and methodologies of proactive organizational development program management cover a wide range of projects and programs implemented in real companies—independently whether the organization is project oriented or not.

Implementation of a proactive organizational development program management model would allow an organization to advance to a high maturity level in project management area and assure stable development in a competitive environment.

This chapter introduced the concept of using information to assess the management system of the organization and the project. This parameter shows the complexity and organization of the business. We discussed how the organization and the project behave in case of poor management and what is the importance and value of necessary information. One always should look for a balance between the complexity of the business—required accuracy of business monitoring on the one side, and the capacity of the management system to make decisions and the cost of the management system on the other side.

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CHAPTER 31
PROJECT MANAGEMENT USING EARNED VALUE MANAGEMENT

Wayne F. Abba

For 17 years before retiring in 1999, Wayne Abba served as the senior program analyst for contract performance management in the Office of the Secretary of Defense. He was awarded the Secretary of Defense Medal for Meritorious Civilian Service in 1993, 1997, and 1999 in recognition for being "the driving force in the acceptance of effective and efficient integrated cost, schedule, and technical performance management principles throughout Defense industry, in the Federal Government at large, and in the governments and industries of friendly foreign countries." He is an internationally acclaimed spokesperson for earned value management and an independent management consultant specializing in the public sector.

31.1 INTRODUCTION

During the Cold War era, defense programs grew increasingly complex as the United States invested in new technology to maintain military superiority. As intercontinental ballistic missiles, nuclear powered ships, and other advanced weapons systems were conceived, the military departments and their contractors faced unprecedented challenges in managing the cost, schedule, and technical performance of the highly sophisticated projects required to develop and produce the systems.

Those challenges were met through project management. Indeed, the Department of Defense and its industrial base may be viewed as a project management laboratory where new techniques are tested. Those techniques found useful are adopted and refined while those that are not useful are relegated to the scrap heap. Earned value management, or EVM, has proved to be one of the most enduring techniques through more than 40 years of continuous use.

31.2 WHAT IS EVM?

EVM is a way to manage a project by quantifying in dollars, hours, or other measurable units the labor, material, and other resources required to perform all the project work and developing a time-phased plan for expending the resources. As work is performed, the project team measures progress periodically using three basic metrics: how much of the work was planned to be performed at any point in time (planned value), how much of that work was accomplished (earned value), and what costs were incurred in accomplishing the work (actual cost).

The objective measure of accomplishment—earned value—distinguishes EVM from other project management control techniques. Electronic Industries Alliance Standard EIA-748-B[1] (adopted in accordance with American National Standards Institute [ANSI] patent policy) defines EVM as follows:

> The essence of earned value management is that at some level of detail appropriate for the degree of technical, schedule, and cost risk or uncertainty associated with the program, a target planned value (i.e., budget) is established for each scheduled element of work. As these elements of work are completed, their target planned values are "earned." As such, work progress is quantified and the earned value becomes a metric against which to measure both what was spent to perform the work and what was scheduled to have been accomplished.
>
> Schedule variances, which cannot be seen in a stand-alone budget versus actual cost tracking system, are isolated and quantified, and the cost variances are true cost variances that are not distorted by schedule performance. It is this ability to generate variances that differentiates EVM from traditional "budget versus actual cost" tracking systems. This provides for early identification of performance trends and variances from the management plan, and allows management decision making while there is adequate time to implement effective corrective actions. Without earned value, one can only compare planned expenditures with how much has been spent, which does not provide an objective indication of how much of the planned work was actually accomplished.

Space does not permit a more detailed explanation of EVM. Readers seeking more information will find a growing body of literature including the Project Management Institute's *Practice Standard for Earned Value Management*, published by PMI in 2005 as a supplement to *A Guide to the Project Management Body of Knowledge* (PMBOK Guide).

31.3 EVOLUTION OF EVM

Earned value management was first implemented in the mid-1960s by the U.S. Air Force as the Cost Schedule Planning and Control Specification, or CSPCS (commonly called "CSPEC"). From there it was adopted in 1967 for use throughout the Department of Defense and renamed Cost/Schedule Control Systems Criteria (C/SCSC or C/S^2). The department's overall performance measurement system for its contractors also included a technical component. Military Standard 499, "System Engineering Management," provided requirements for interfacing technical performance with C/SCSC. Together, these pioneering documents provided for a fully integrated system designed to manage and report contract cost, schedule, and technical performance.

Although the cost, schedule, and technical processes were designed to work together, they belonged to different sponsors. The top-level Pentagon EVM policy office was established under the comptroller in the Office of the Secretary of Defense. Given that financial policy ownership, EVM from the beginning was identified with financial management. This had both positive and negative consequences. On the positive side, EVM enjoyed a high degree of independence from project managers. The comptroller's office not only presided over the policy but also reviewed EVM reports on defense contracts and provided to senior leaders an unbiased assessment of contract status and estimates of cost at completion.

Over the years, the EVM analysts honed their ability to summarize performance quickly on hundreds of defense contracts and provide estimates to top management for comparison with those provided by defense project managers. Contractors typically reported detailed EVM data monthly to their defense customers. The project managers summarized those reports and reported top level (Work Breakdown Structure Level 1) information to the Pentagon once each quarter. Despite having less data available than at any other organizational level, the Pentagon analysts repeatedly were ahead of the PMs in spotting unfavorable performance trends.

Why might this be true? Project managers are highly capable people, given to optimism about their ability to reverse cost overruns and schedule delays. On the other hand, the EVM analysts, relying on a continuously growing contract database, had a sound basis for their predictions. In the 1990s, the Pentagon database was made available to researchers led by Dr. David Christensen at the Air Force Institute of Technology. Dr. Christensen and his graduate students published several papers on earned value management and analysis, creating an invaluable body of knowledge based on hundreds of completed contracts. This information is available to the public through the online Electronic Library maintained by the Project Management Institute's College of Performance Management (www.pmi-cpm.org).

On the negative side, the independent location in the comptroller's office also isolated the earned value discipline from the project and procurement managers directly responsible for implementing EVM on contracts. Uniform, mandatory management and reporting requirements were imposed on high value, high risk, cost-based contracts, and contractors were subjected to repetitive management reviews by the military commands that issued the contracts.

As might be expected, reviewers found big problems when contractors were first evaluated against the new EVM requirements. Also, as might be expected, the problems found on subsequent reviews were relatively smaller. But the reviews continued and became increasingly stringent. Judgment was replaced by adherence to detailed checklists in a process that can be likened to a ratchet—the most stringent interpretation on one review becomes the minimum standard for the next. And the ratchet never releases. This is an immutable law of bureaucracy.

A subculture of C/S^2 specialists in government, supplemented by consultants who built their businesses by advising defense companies on how to pass the reviews, made EVM much more difficult than necessary. The more difficult and "audit-like" EVM became, the less value it had for contractors and government project managers, many of whom regarded it as a financial reporting requirement and did not pay attention to the valuable information it provided.

31.4 FAILURE AND REINVENTION

The stage was set for failure on a massive scale. It happened in the early 1990s, when a Pentagon EVM analyst identified a billion-dollar cost overrun on the A-12 Avenger II, a highly classified Navy stealth aircraft program. The analysis led to termination of the contract for default, the largest such termination in history and one that reverberates through ongoing litigation more than 16 years later.[2]

Investigation showed that EVM reports from the contractor clearly showed the contract's overrun status and provided a basis for realistic cost estimates, but the reports were not used. Management failure on such a large scale led quickly to reassessment of the Pentagon's EVM policy and implementation practices. The main findings of the investigative team with respect to EVM were as follows[3]:

- Too often, earned value insights remain the sole province of the supporting program control staff of both contractors and the government.
- Earned value must be an integral part of the performing design and manufacturing organizations.
- Only when program technical staffs are held accountable for earned value analysis, will they begin to understand its implications.

For Mr. Gary Christle, the Pentagon EVM office director, the A-12 fiasco was the last straw. Despite its enormous value for management and oversight, EVM implementation was failing to deliver good results. With rules increasingly replacing judgment, contractor systems became expensive to operate, while producing reports that were not used either by contractor or government managers. Mr. Christle outlined a new vision to the government/industry EVM community at its annual conference in 1993, calling on them to restore EVM to its intended use as a management tool. Government and industry responded to his call. The next few years saw several far-reaching developments, notably less bureaucracy on the government side and development of a proposed management standard by industry. With government encouragement, the standard was issued in 1998 as ANSI/EIA 748.

Of course, change on such a scale does not come quickly or easily. But by bureaucratic terms, changes under Mr. Christle's leadership were fast and far-reaching. The management improvements he initiated were embraced outside the defense industry, including purely commercial programs. By

July 1999, when Boeing, Microsoft, and CH2M Hill cosponsored a commercial EVM conference in Seattle, those results were apparent. In his keynote address, Mr. Scott Carson, then the chief financial officer of Boeing Commercial Airplanes[4], said that when he was with the Boeing defense organization, its contracts were for products designed to defeat the former Soviet Union. The contracts included requirements for earned value reporting that Boeing and other defense companies resented and resisted.

Mr. Carson described how Boeing was remaking itself as a performance-based organization. He had just returned from negotiating commercial deals with Boeing's new industrial partners in Russia. The agreements included the same kinds of EVM requirements that the Department of Defense had demanded of Boeing. Mr. Carson said he didn't know which was more revolutionary—that Boeing was working with the Russians or that it was embracing management concepts from the Department of Defense.

31.5 GLOBAL INTEREST IN EVM

The changes in U.S. defense management did not go unnoticed by other countries. Facing their own contract management problems, first Australia, followed by Canada, Sweden, and the United Kingdom, modeled their defense industrial management processes on the U.S. example. Australia and Canada sent representatives to the Pentagon in search of better management techniques. In Australia, the search was initiated by a Parliamentary Committee of Inquiry following cost blowouts on a navy ship program and on construction of the new Parliament House. In Canada, the search was prompted by the Treasury Board Secretariat when problems arose in government information technology programs. Later, Japan joined the growing international EVM community, but from the Ministry of Construction, not defense.

Misery loves company—and the interactions among public servants in the various countries proved they were not alone and could learn from one another. From those beginnings, three countries have signed agreements to mutually recognize contractor management control systems for use on contracts awarded by any of the signatories. A trilateral memorandum of understanding was executed by the defense organizations in Australia, Canada, and the United States in 1995 and renewed in 2005 for another 10 years.[5]

Given EVM's demonstrated value for contract oversight, its appeal to governments and to contractors that had long experience with EVM-based project management is obvious. But can that value be realized by the wider project management world? The answer is emphatically "yes," largely thanks to leadership from professional associations and to government regulation.

31.6 PROFESSIONAL ASSOCIATIONS AND EVM

In the 1980s, a group of EVM specialists formed the Performance Management Association. At its peak, PMA had some 800 members. Although it helped spread the word about EVM, PMA was by definition a closed society. In the mid-1990s some of its members noticed that the Project Management Institute, a rapidly growing association of project managers, was beginning to incorporate EVM in its conferences.

PMI represented an opportunity for PMA to reach its intended project management audience and shed its "bean counter" image. In 1999 PMA dissolved and became PMI's first college. Many PMA members worried that with its small size, it would play Jonah to the PMI whale—but today, with PMI approaching a quarter million members, the College of Performance Management is robust and growing. It sponsors an annual conference in the United States, cosponsors an international conference with the Society of Cost Estimating and Analysis and the National Defense Industrial Association, and cosponsors conferences in Australia and Japan.

PMI-CPM members represent more than 60 countries. They work in all kinds of industries and government. Acting often on their own, with no government mandate, they are finding ways to use

EVM in nontraditional ways ranging from football stadium renovation in Portugal to mining in Indonesia.

Other associations also have climbed aboard. For example, the International Council on Systems Engineering and the Society of Cost Estimating and Analysis feature EVM in their programs. The Association for the Advancement of Cost Engineering International sponsors an Earned Value Professional Certification program (with support from PMI-CPM)[6]. In the United Kingdom, the Association for Project Management's Earned Value Specific Interest Group has published a CD on Earned Value Management, including guidelines that are recognized by the National Defense Industrial Association as equivalent to the guidelines in EIA-748. This "reciprocity agreement" is important for companies that do business with the U.S. and U.K. governments, as companies may use either document as the basis for their management control systems.

31.7 GOVERNMENT REGULATION AND EVM

During the 1990s, the Department of Defense and the National Aeronautics and Space Administration brought their EVM policies into alignment because they shared many of the same aerospace contractors. However, other government agencies, such as the Department of Transportation and the Department of Energy, either ignored EVM or did not take it very seriously.

As the twentieth century drew to a close, the Office of Management and Budget in the Executive Office of the President required all federal agencies to adopt the same EVM management concepts used by Defense and NASA. The OMB also required the agencies to report earned value status for their programs during the annual budget approval process. Each year since, OMB has gradually tightened the requirements and has both penalized and rewarded agencies based on the quality of their business cases and their program management.

In 2002, OMB required all government agencies and their contractors to use the ANSI standard as the basis for project management and reporting. When agencies submit budget proposals to OMB, they must be supported by strong business cases and project management plans for their capital investments, based on the ANSI standard. In this way government reform efforts begun in the Department of Defense now are defined in an ANSI standard and put all government agencies on equal footing in terms of management expectations. Agencies are expected to achieve 90 percent of cost, schedule, and performance goals and must report to OMB annually, including their contractors' EVM data.

31.8 LESSONS LEARNED

The extensive EVM experience includes a vast body of lessons learned, many of them at the public's expense in defense projects. Defense projects may not seem at first blush to be useful examples for other projects, especially those that are much smaller. However, that is not the case. Project management principles are universal—and scalable. That certainly is true of EVM and is the basis for the ANSI standard.

Scalability means the management principles embodied in the standard are meant to be used judiciously. While projects by definition are unique, all may be characterized in terms of their size, duration, complexity, and risk. Projects at the more complex end of the scale require the highest degree of control. For such projects, EVM can assure detailed, auditable performance measurement for all resources—labor, material, and any other direct and indirect costs. At the lower end of the spectrum, EVM can be implemented in simpler ways more appropriate to the project circumstances.

31.8.1 Planning

Earned value management is about project control. It is difficult if not impossible to establish control once a project is underway. The greater the investment in planning before a project begins, the less the likelihood of unpleasant surprises during its execution.

Planning involves several disciplines. Systems engineering, cost estimating, scheduling, contracting, and risk management all have important roles to play. Too often these disciplines do not work together but act in classic "silo" fashion, with each operating in relative isolation from the others. The consequences are predictable—ill-defined projects thrown "over the transom" to the project management team.

Defense project planning is founded on well-known principles: a work breakdown structure that captures the entire scope of work and provides a framework for project planning and control, a realistic cost estimate coupled with contract structures that apportion risk as necessary between customer and supplier, and clear assignment of responsibility for performance. But when the responsible organizations do not work together, these principles may actually operate at cross purposes. This can occur, for example, when a government agency awards a risky development contract on a firm-fixed price basis and does not provide for EVM reporting. The all-too predictable result may be a contract claim, or in the worst case, nonperformance. (Of course, a contract is a formal agreement of terms between two parties—but that's a different subject.)

The Department of Defense introduced in the 1990s a new planning process called the Integrated Baseline Review. Unlike the traditional reviews of contractor management systems conducted by C/S^2 specialists, the IBR was intended to ensure early in contract performance that an adequate plan was in place—a plan that addressed the contract scope, schedule, resource plan, and risk management and that was mutually understood by both parties. The process begins as soon as possible after contract award and involves all stakeholders.

Project managers in government and industry welcomed the IBR as a better way of doing business. It puts project resource management where it belongs—in the hands of the customer and supplier teams that do the work. In 2003 the Department of Defense gathered best practices from its contracting offices and issued the "Program Managers Guide to the Review of an Integrated Baseline." It lists these expected benefits and key elements:

- Lays a solid foundation for mutual understanding of project risks
- Provides an invaluable opportunity to compare (government and contractor) PMs' expectations, and to address differences before problems arise
- Provides project management teams with a thorough understanding of the project plan and its risks, allowing early intervention and the application of resources to address project challenges
- Increases confidence in the project performance measurement baseline, which provides a powerful, proactive, program management capability to obtain timely and reliable cost and schedule projections

Additional, continuing benefits to the PMs, once a performance measurement baseline has been established and the IBR Process has been implemented, include the following:

- **Management insight.** Enables the principles of management by exception and improves problem traceability rather than require continuous oversight of all tasks.
- **Early warning.** Indicates potential problems early.
- **Earned value management.** Enables management to quantify the impact of known problems, to measure work accomplished, and to obtain realistic estimates at completion.

31.9 KEY ELEMENTS

The key elements in the IBR Process are the following:

- The IBR Process establishes and maintains a mutual understanding of the performance measurement baseline and mitigates program risk.
- Preparation for the IBR should begin as soon as practical.
- Before executing the IBR, ensure the performance measurement baseline reflects the entire scope of work, documented at the appropriate level of detail.

- Preparation includes planning that identifies key responsibilities, required technical expertise, training, review dates, review scope, risk evaluation criteria, documentation needs, disposition of findings, and procedures for risk identification, documentation, and incorporation into project risk management planning.
- The intent of the IBR is to provide the PMs with a mutual understanding of the project performance measurement baseline and to attain agreement on a plan of action to handle the identified risks.
- Anything that does not support the intent of the IBR should be moved outside the review.
- Technical, schedule, cost, resource, and management processes risks identified during the IBR should be reviewed; action risks should be incorporated into the project risk management planning.
- Management processes provide the PMs with a continuous source of project information that enables mutual understanding and the reduction or elimination of the need for future IBRs.[7]

The guide was prepared with substantial help from industry and other government agencies. The IBR process, with its emphasis on thorough planning and effective teamwork between customer and supplier, has proved its worth in innumerable contracts. In July 2006, OMB added to the Federal Acquisition Regulation a provision requiring IBRs for all government agencies and allowing contracting officers to employ IBR principles even before contract award as a means to reduce performance risk. Guidance for conducting IBRs is contained in Part 34 of the Federal Acquisition Regulation, which is issued and maintained jointly under the statutory authorities granted to the Secretary of Defense, Administrator of General Services and the Administrator, National Aeronautics and Space Administration.

The following information outlines the 34.202 Integrated Baseline Reviews:

1. When an EVMS is required, the government will conduct an Integrated Baseline Review (IBR).
2. The purpose of the IBR is to verify the technical content and the realism of the related performance budgets, resources, and schedules. It should provide a mutual understanding of the inherent risks in offerors'/contractors' performance plans and the underlying management control systems, and it should formulate a plan to handle these risks.
3. The IBR is a joint assessment by the offeror or contractor and the government of the
   - Ability of the project's technical plan to achieve the objectives of the scope of work;
   - Adequacy of the time allocated for performing the defined tasks to successfully achieve the project schedule objectives;
   - Ability of the Performance Measurement Baseline (PMB) to successfully execute the project and attain cost objectives, recognizing the relationship between budget resources, funding, schedule, and scope of work;
   - Availability of personnel, facilities, and equipment when required, to perform the defined tasks needed to execute the program successfully; and
   - The degree to which the management process provides effective and integrated technical/schedule/cost planning and baseline control.
4. The timing and conduct of the IBR shall be in accordance with agency procedures. If a pre-award IBR will be conducted, the solicitation must include the procedures for conducting the IBR and address whether offerors will be reimbursed for the associated costs. If permitted, reimbursement of offerors' pre-award IBR costs is governed by the provisions of FAR Part 31.[8]

By providing for reimbursement of offerors' pre-award costs, the government underscores the importance of adequate planning for its contracts. The government often is criticized for mandating requirements without providing the necessary resources. In this case, the government is encouraging its contractors to adopt effective project management using EVM—and is backing up its encouragement with money.

31.9.1 Performing

The emphasis on teamwork and planning using the IBR helps government and industry project management teams strike the right balance between control and flexibility. While program control is a good thing, overcontrol is too much of a good thing. Indeed, that is what gave C/S^2 a bad name. There is no single formula to find that balance—it's a function of project complexity and the extent of risk sharing between the contracting parties (or the project sponsor and the management team).

When the right balance is found—when the parties agree that they understand the project scope, schedule, and how resources will be applied and managed—then project reporting can become a natural by-product of management, rather than an externally imposed oversight requirement. Such an ideal is not easy to achieve. But when it is, the results can be stunning, as with the Navy's F/A-18E/F Super Hornet program—the successor to the failed A-12.

McDonnell Aircraft Company (later acquired by Boeing), the Super Hornet prime contractor, pioneered the use of EVM on a weekly basis, four times more frequently than the typical monthly cycle. That decision allowed management teams to solve problems as they were identified, minimizing their effect on cost and schedule. It also made earned value a normal, expected part of the project management process rather than a separate report. The result? A program that met its cost, schedule, and performance goals and earned several honors at the end of the 1990s, including the Defense Department's David Packard Award for Excellence in Acquisition and the Collier Trophy, a national award honoring those who made significant achievements in the advancement of aviation.

The Super Hornet embraced all the principles described in this chapter—EVM based not on external reporting requirements but on internal management needs, transparency between customer and supplier, a culture that advocated openness and encouraged managers to ask for assistance when needed.

31.10 CONCLUSION

In government, improvement too often is the result of failure or crisis. The A-12 represents the ultimate failure—a multibillion-dollar acquisition program that was terminated because it failed to deliver on its promises. Today, with OMB's leadership, the government is moving steadily toward a project-managed culture based on EVM. While government agencies may see the new emphasis on project management as an imposition—and a budget crisis when they are found wanting—the result will be better, more efficient and accountable government management.

Thanks to the United States government, the National Defense Industrial Association, and the Project Management Institute's College of Performance Management, EVM has moved well beyond its origins in defense contracting into the project management mainstream. The management standards, guides, and government regulations produced by these organizations are rich sources of information for other governments and for companies that want to manage their projects using EVM as the most effective tool to integrate scope, cost, and schedule performance with risk management.

31.11 REFERENCES

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2. The author testified in the fifth trial in 2001 as an expert witness on behalf of the Department of Justice/Navy Litigation Team.
3. U.S. Department of Defense. Department of the Navy. "A-12 Administrative Inquiry." Memorandum for the Secretary of the Navy by Chester Paul Beach. (Washington, DC: Office of the Secretary of the Navy. November 28, 1990), p. 6.

4. Mr. Carson is now executive vice president of The Boeing Company and president and chief executive officer of Boeing Commercial Airplanes.
5. See Department of Defense Earned Value Management Web site, www.acq.osd.mil/pm/internat/ipmc/ipmc.html#csmou.
6. See the Association for the Advancement of Cost Engineering International Web site, www.aacei.org/.
7. See Department of Defense Earned Value Management Web site, www.acq.osd.mil/pm/ibrmats/IBR%20Documents/IBR_PM_Guide_April_2003.doc.
8. See Federal Acquisition Regulation Web site, www.acquisition.gov/far/.

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CHAPTER 32
IT'S A LONG ROAD TO ORGANIZATIONAL MATURITY

John H. Scanlin

John H. Scanlin has more than 30 years of project experience in application development, technical services, and the telecommunications industry in commercial and federal markets. He has been a speaker at ProjectWorld in California and Washington, DC, and at the ABT Corp Leadership conference in San Francisco. He led a task force for Bell Atlantic and was named its first director of their corporate project management office (PMO) in 1995, later publishing in the June 1998 "*Project Management Journal*" on the "PMO Use of the Internet." Mr. Scanlin has been an active board member of the Project Management Institute (PMI) Washington, DC chapter since 1997 where he was recently recognized for his past service and his 2005 trip to Uriguay and Argentina for PMI WDC's inaugural chapter to chapter program with the first Leadership Execllence Award. He has been a project management professional (PMP) since 1996 and is currently a program manager for several large federal agency contracts.

32.1 INTRODUCTION: BACKGROUND

It was late 1994 and Bell Atlantic was a strong regional Bell company with 100 plus years of history and regulation, entrenched in the northeastern states from New Jersey to Virginia and the District of Columbia. Each of the operating units had its own version of project management methodology ranging from almost nothing to the information systems (IS) organization with a strong commitment and progress (level 2 headed to level 3) to becoming International Organization for Standardization (ISO) certified via the Capability Maturity Model (CMM). There were no corporate position descriptions for project managers, very few standardized processes for managing the multitude of products and services, and the tools ranged from checklists and Excel spreadsheets on the one extreme, to complex IS projects using their standard, Project Workbench for Windows (PWW), with rigorous work breakdown structures to manage schedule and cost control.

By mid-1994, more than 2,000 people, primarily from the IS organization, had attended a three-day project management class. But the telecommunication business had grown significantly more complex in products and services without a corresponding increase in the PM training. Much of what was being practiced was project coordination versus modern proactive project management. "Cut-over" managers were selected to lead projects where the integration of products and services were being sold in new, diverse environments without complete understanding and planning to meet the increased customer demand for quality. The rest of this article deliberately excludes the information systems community where the shear size of the projects in terms of headcount and dollars and the risk of new products missing their schedules mandated having a strong top-down project management organization.

The pendulum had just begun to swing from supervisors making all the decisions (i.e., training) to the employees becoming empowered to plan their own development. Service quality indicator trends were headed down, a major concern as the industry moved rapidly to an unregulated, highly competitive marketplace. Many of the (non-IS) technical folks were falling into the "accidental discipline"

TABLE 32.1 Comparison of PM Training & Certification (1995)

Description	Bell Atlantic	AT&T
Professional development program in place for PMs	5 months	71 months
PMs involved in professional development training*	50+	4,500+
Master's certificate in PM	10	1,300+
PMs with certification from PMI (PMPs)	2	550+

* Excludes Bell Atlantic's IT organization

with only the formality of the three-day overview class of project management. Several business units had independently formed committees to focus on training and certification for their project managers.

There was not a lot of solid data to quantify the maturity level of the Bell Atlantic program as compared to peer companies until over a year later when I attended a special workshop in Aspen, Colorado, with other project management offices (PMO) personnel and compared notes with my counterpart at AT&T. The workshop was hosted by Dr. J. Davidson Frame, who headed the George Washington University PM program, and his focus was the future direction of certification beyond the PMP. Even though AT&T was perhaps a bit more than three times our size, Table 32.1 shows the ratio of key indicators for the maturity of our program was completely disproportionate when we were competing for the same customers. From the data it was clearly evident that AT&T was several years ahead of Bell Atlantic in the strategic investment in their project managers and their training and processes.

I had recently made a major career change, leaving IBM after 28 years as an application development programmer and manager in both federal and commercial divisions, having been hired as a project manager into Bell Atlantic's mid-Atlantic region in the Operations Division. This unit was the largest of the 11 independent units (also known as *silos* in the telecommunications community). A key point during the hiring process was that I had committed to provide Don, my first director, a different perspective on managing projects than perhaps the rest of his career telecomm project managers had been using. Together, we believed we could make a positive change in the customer satisfaction ratings for the organization.

"If the king wears no clothes, I promise to tell you that," I quipped during my interview, hoping that might provide some balance from the preponderance of Bell perspectives he received every day. He had just begun to test me on telecomm principles for which I had precious little knowledge. "If you were willing to draw on my experience of working with users and using project management principles to provide on time delivery of systems and services to delighted customers, then I'm your guy." This is a story about how a small group of motivated individuals who wanted to make a positive difference in their profession, did just that and eventually, with help and support from a senior corporate executive, created the first corporate project management office in Bell Atlantic, raising the bar in both the training and performance of the project managers across the corporation.

32.2 MAKE OR BUY

The same day I began work in Falls Church, Virginia, a group of about 20 people, primarily managers of project teams from five of the eleven units, were gathering to decide how they were going to implement a program to "certify" their project managers. Don told me to accompany him since it would be a good introduction on the state of project management and some of the players I would be working with. The proposal on the agenda was tailored very similar to the current method of certification of the system engineers. This entailed a series of progressively more complex series of classes, some internal, some commercially available locally and those available from Bellcore Technical Education Center in Illinois. Much of the discussion for the next three plus hours focused on how to select who would go through the program, what classes would be required, are the classes even available, and how the students would be tested if such a program was instituted.

Throughout the afternoon the options being offered on how to infuse new ideas and approaches seemed narrow. Little had I anticipated that I would be seeing "the king with no clothes" literally my first day of work! Once it was clear the group had reached a consensus in selecting a parallel path to the existing system engineer's certification program and were about to begin planning the steps to implement it, I introduced the point that we were faced with a classic "make or buy" decision.

Point #1: Clearly our group has a *severely constrained resource of project managers*, so we'd be robbing Peter to pay Paul by expecting our group to develop a career path, formalize corporate (each operating unit had versions of their own) position descriptions, and develop tests that would satisfy the rigors of the human resources specialists. Then we'd need to create standardized processes and get all units to agree on them, create or customize course work to sustain all the diverse needs of the newly created positions for assistant project manager, project manager, senior project manager, and so forth.

Point #2: Assuming we were able to share the load for the staffing in Point #1, the timeline to see everything completed within nine months to a year would be very aggressive indeed. The payback period would be deferred and the launch of the formal program delayed before we'd expect to see new processes, thus improvements to customer satisfaction ratings may be at least a year and a half or two away.

Point #3: This point is even more important than #1 and #2 combined, namely, if we develop our own Bell Atlantic project management certification, it will be worth a big fat zero in the marketplace!

That argument got everyone's attention, so we began to look at the possibility of making a "buy" versus "build our own" using the following rationale:

Point # 1—We'd still need some very experienced team representatives from the various operating units; their role would become more of oversight and guidance rather than "down in the trenches developing the work products." The net result is we'd have an improved program much sooner, and our customers would be reaping the benefits earlier.

Point #2—Making a "buy" decision means selecting from an existing pool of training vendors and readily available classes, thus the individual project managers could begin their formalized training classes a full year earlier once a request for proposal (RFP) was out on the street; responses were evaluated, and Bell Atlantic's primary training vendor had been selected.

Point #3—Most importantly, we could and should agree to adopt the Project Management Institute's standard, "Project Management Body of Knowledge (PMBOK) Guide and its certification program as our own. There would be instant credibility in the marketplace where many customers have already adopted PMI standards for their project managers. Additionally, the planning and execution of larger projects where a variety of vendors are required to deliver their sub modules/tasks becomes more manageable when common language, tools, and standards are understood and practiced.

The meeting facilitator rose and said several solid points for this "buy" approach had been made for the team to consider, so he scheduled another meeting several weeks later to come back together and make a final decision on our program. While there seemed to be significant agreement among the attendees as we broke for the day, there was probably a wide range of attitudes, from true excitement to "it will never happen."

32.3 DECISION TIME

Prior to the next meeting, we scrambled to search for PM training companies with a presence in the northeast Bell Atlantic footprint that could meet the requirements for course work. Knowing we were going to link the training requirement to our goal for full-time project managers obtaining their PMI certification, we looked for vendors who had an existing curriculum based on PMI's PMBOK, competitive pricing, quality instructors, regional recognition, and solid customer references. We reviewed several universities, PMI's list of Registered Educational Providers, Educational Services Institute (ESI), American Management Association, and Computer Science Corporation. ESI came out on top of our selection list as they ranked consistently high on the criteria, had good recognition through their affiliation with George Washington University, and were located in the D.C. area where almost two-thirds of our target project management community was located.

My task was to begin digging into PMI and its local organizations to see where we might go for some assistance or guidance. I was not yet a member of PMI, and attempts to use their corporate contact numbers didn't yield local contacts. The IBM Industrial Sector Division had just begun to implement their internal certification training of project and program managers just as I left. We were following the evolving IBM standards, such as the Federal Systems Division, with some tremendous program management experience from major federal space exploration programs, such as the Saturn Instrument Unit, as well as other commercial divisions with major systems application development cycles. (It was some two years later that Lew Gerstner, CEO of IBM, after listening to a vice president of sales for Educational Services International Inc. [ESI], made the decision to have all of their career project managers "become certified by PMI within three years or consider finding another career.")

The task force met again the following month, and this time we made the decision to adopt the PMI standards rather than roll our own. By this time there was a certain level of excitement and pride exhibited by the members with a free flow of suggestions as the vision of where we were headed began to take shape. Exposure to PMI's PMBOK and their certification test standards, its rapid growth and worldwide credentials, and the realization we could get it done, "cheaper, faster, better" and gain marketing value along the way became the stronger case, and external PMI certification prevailed. We agreed to develop the requirements and put an RFP out on the street for a training program to meet PMI's qualifications for PMP. Up to this point we were a self-empowered committee, operating beneath the level of any executive management radar, deciding in a sort of vacuum where we felt Bell Atlantic should be headed. It was clear we were beginning to operate beyond our pay grade and would soon need funding and executive support to move this concept forward, particularly with regard to training budgets. So before we broke that afternoon, we drafted the outline of a letter and later sent it to the presidents of all the Bell Atlantic operating units where we presented the following information:

- Introduced the formation of a divisional project management task force
- Summarized what's been done and where we're headed
- Stated the objective for divisional standards for processes
- Committed to the development of the first ever PM corporate position descriptions within Bell Atlantic
- Sought representatives to the task force from each operating unit
- Asked for a senior management "champion" to work with the team
- Stated a tentative timeline of nine months to "deliver the program."

The letter defined the purpose of the task force and required some additional information:

1. Identify stakeholders in the Project Manager Certification Project.
2. Define the deliverables (list them, their content, and suggested format).
3. Develop the major milestones (list the milestones and either a date for completion or elapsed time).
4. List the deliverables associated with each phase or milestone.
5. Collect and discuss expectations for this project (list your expectations in terms of benefits, process changes, potential risks, etc.).

32.4 A MAJOR MISSTEP WITH A HAPPY ENDING

One of the recipients of our letter was the corporate vice president of human resources, John Gamba, who upon receiving the letter, invited some committee members to his office and demanded to know who had the audacity to send an unsigned letter to all his presidents. What initially appeared as a major firestorm headed for disaster due to failed protocol quickly did a 180-degree turn. It turned out that Mr. Gamba actually had been an early believer in project management, had mandated his entire staff participate in a half-day training session the previous year, and eventually would ask Tony Murray, then president of the Federal Systems unit, to be our champion for this project. Mr. Gamba saw the value in establishing standardized corporate position descriptions and a career path for project managers (there had not been any before this), and he became the corporate sponsor for the project, a major milestone and the Project Management Center of Excellence (PM COE) was official!

In September 1994, the regional task force began to write a description of the project, how it had evolved with a "bottom up" effort within the team, and its objectives:

- Consolidate the PM activity across the company.
- Document reoccurring issues and potential solutions.
- Develop a Statement of Work with the following deliverables:
  - certification program for all full-time project managers
  - position descriptions (associate project manager, project manager, senior project manager)
  - communication/plan to senior management and across and down silos to project teams
  - assessments of our tools and processes
  - advanced PM training
  - implementation plan
  - most importantly, a permanent Center of Excellence (COE)/(project management office) with a director and small staff

In early 1995, we were underway and still excited. Perhaps one reason for our excitement was we had a corporate sponsor from HR where a key guiding principle was "Lead change in Bell Atlantic to achieve world class customer satisfaction through empowered employees." We all believed we were doing just that! For the first time ever, one of the major business goals in 1995 became "Create and establish a new Project Management Center of Excellence to provide corporate leadership in developing and institutionalizing project management discipline and competencies throughout Bell Atlantic." Our corporate sponsor was equally fired up and creating the vision of where we wanted to aspire. Mr. Gamba knew this investment in training and processes was not free, so he also added the following measurement into the operating philosophy: "Accountability: Our work is not complete until the key strategies that have been agreed to are fully developed and deployed throughout Bell Atlantic. We will measure the implementation process and evaluate the success of the strategies against the business case. We will coach the people of Bell Atlantic to facilitate implementation."

32.5 A TEAM COMMITTED TO SUCCESS

Many of the issues facing the project managers were collected either during the monthly working sessions or subsequent e-mails following those sessions as everyone continued to carry the responsibility of their regular projects. The commitment of the members of this all-volunteer team, especially the federal team representatives with their "lived" examples, spoke volumes for me as a new team member, since they were already overloaded yet willing to make the time needed to raise the level of performance of project managers through better processes and upper management support. Collectively, there was camaraderie across the team that we knew this company, already a good one, could become much better and that each one of us was going to become a critical change agent in making it happen. The issues we dealt with will be discussed in the rest of the chapter.

32.5.1 Issues Raised During the Project

Projects Delivered "Over the Wall." The standard process at the time was for sales to obtain proposal resources to respond to an RFP during the executive management review, develop the RFP response, and only after contract award would the project manager be named to implement the solution. He or she would have almost no knowledge of the issues or concerns expressed by the customer during the orals or "best and final" deliberations by the proposal team. Even the risks associated with the various technical solutions were often not documented to be passed onto the project manager and the implementation team. Often this was compounded when the customer was a Department of Defense headquarters unit developing the RFP and evaluating the vendor's solutions for installation in the field at a military base far removed from those directly involved in the acquisition process and decisions.

The eventual recommendation, seemingly radical twelve years ago but almost a standard practice in today's unregulated world—especially for customer accounts managed by a program manager—was to have the proposed project manager either actively participate in proposal team discussions or at least review the program management section of the RFP response prior to submission. This allowed field-practical experience to influence the verbiage and, more importantly, provide clarification of loosely written sales responses months before they surfaced as issues due solely to customer misunderstandings.

Processes Either not Documented or Inconsistent. Whenever there were regional projects, such as a regional bank involved in major acquisitions deploying new or upgraded ATM systems, the processes for coordination for "cutovers" varied sometimes significantly between the New Jersey and the Virginia operations groups. Often these differences didn't surface until the night of cutover where one team's process had verified their access to secure facilities, yet another team might get delayed for hours or be denied access to the building, resulting in either rescheduling or major delays for multiple teams across the network. During these discussions it became obvious that my experience in the data processing culture of IBM to record meetings or conferences was dramatically different than the predominant communication method in the telecommunications industry, which is to immediately pick up the phone and give the information or get your answer. The short-term benefit of calling an engineer or customer and getting a quick decision on an issue is lost—not only for other team members who were unaware of the reasons for the decision but also for the future generations of similar projects—when the major points, pluses, and minuses are not documented and shared. The practice today is better known as "knowledge management."

Our investigations led us to not only develop consistent processes but to avoid making the same mistake other companies had made early in the development of their processes when they created volume after volume of written documentation. These early masterpieces merely occupied the prime real estate of the PM's bookshelves—read once and rarely again, not easily applied to new projects, and never read by the new PMs. All agreed the processes had to be visual, readily accessible and updateable, in softcopy format, with templates for reuse, and so forth. In other words, once developed, they must be placed on the corporate intranet.

Later in this chapter, the merger of Bell Atlantic and Nynex is discussed as to its direct impact on the PM COE. It was during that period when I worked closely with my counterpart from Nynex and their PM processes. Eventually, we were able to post a consistent process for project execution on our Web site. The number of pages of process was extensive and multilayered with examples and templates for use as one drilled down through the process from phase to phase. See an example of the processes described in Figure 32.1.

Formal Risk Management Either Missing or Incomplete. Formal risk management was not a part of the BA operations project culture in early 1995. What did exist was in the collective experience of the project team and especially the engineering team assembled. If your project happened to draw on the "right" team for the specific product, it was their memory and not a data mining of a repository of lessons learned where the warning signs were posted during the planning sessions. Ironically, it was the lack of a solid risk process that enabled me to enlist the support of senior management from the various operating units. When discussing the general objectives of the task force with various unit presidents, since there were no readily available "white papers" on the benefits of PMOs and the PM discipline, instead of taking a positive approach, I often lead with a question such as, "Has there ever been a project where you were either surprised with a major failure in deliverables or significant overrun in cost?" That almost always prompted a staff person to say, "Remember the XYZ

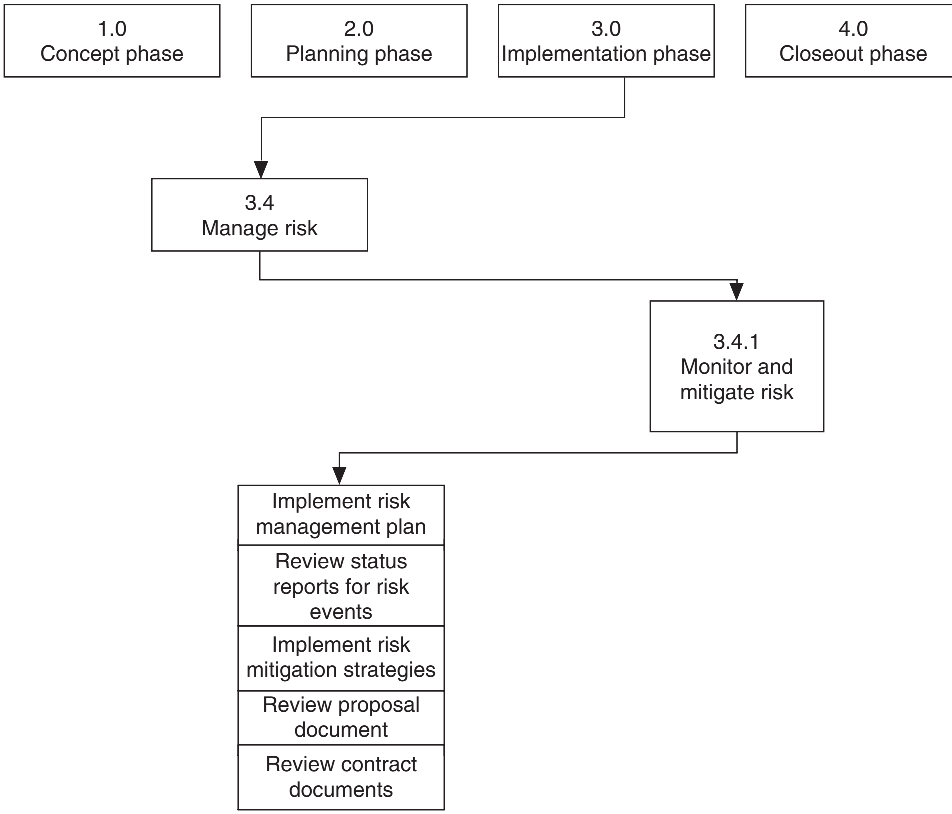

FIGURE 32.1 Example of Web-based PM Process.

project where the customer nearly pulled out of the effort?" or some similar statement. We generally walked away with support from the executive for our task force.

Preliminary risk assessment and limited contingency planning became the requirement for all persons who were coded as one of the three newly created position descriptions (position descriptions are discussed in further detail later in the chapter). While there was considerable variation in the consistency of risk management application at each phase of the project, the seed had been sown for its evolvement. Much of the knowledge for the type of questions to ask at the beginning of each phase came from the growing documentation of the Lessons Learned.

Lessons Learned. Early in the first few months of the PMO, it became obvious there was a significant amount of great "lived" experience in project managers, but no one had a vehicle for sharing that experience with other PMs who might not have any exposure to a particular product/service or customer. That gap in the process was solved by recognizing and rewarding those PMs who made the time to document those lessons learned during their project closeouts. They were encouraged to document the lessons learned and forward them onto the PMO where they were posted to a Web site available for data mining by both experienced project managers and new project managers alike.

The PMO acknowledged each submission to both the project managers, and their supervisor was encouraged to use an informal award process to recognize the employee. At the same time, every supervisor was urged to require their project managers to take a mandatory "visit" to the lessons learned repository each time they were going to take on another project but especially if they had never managed a new service.

Assessments. Bell Atlantic had no assessment tool to aid in the selection of our project managers. The team developed an attributes/characteristics list based upon the represented collective experience of the task force committee. That work session sparked a heated debate regarding the relative importance of the technical knowledge required of a project manager. While no consensus was ever reached, the majority supported a position where a broad knowledge of processes and products was desired but not a requirement for technical depth. A belief was summarized in the following statement: "Let the project managers manage and the subject matter experts (SME) perform."

Two years after the PM COE was created, Bell Atlantic was yet unable to develop a formal assessment process for its project managers. A vendor was allowed to have three experienced project managers go through an assessment test and feedback process at no cost. All three project managers felt quite positive about having been through the assessment process and its value to them in identifying areas for personal improvement. The roadblock was the human resource specialist who cautioned us due to the vendor's data being too old and that it might not pass the litmus test of a court challenge if decisions were made using their results for job entry or promotions. An option to develop our own process using appropriate questions in our standard employment battery of tests died for lack of support, and the same specialist's arguments were used against creation of an internal certification.

Position Descriptions. Position descriptions for project managers were like our processes at the time, never any shortage of them unless you were looking for consistent ones. We obtained versions from various business units and worked down to consistent language for the assistant (entry level) project manager and then increased the scope, value, years of experience, and knowledge for the next higher levels—the project manager and senior project manager positions respectively. A fourth position description, that for a program manager such as those that existed in federal systems programs, spanning multiple years with million dollar revenue targets or those for major IS development programs, was never addressed as a corporate position solely due to our self-imposed time constraints by the task force.

The task force did make inroads in tying formal educational requirements to the new position descriptions and structuring the descriptions following the PMBOK guidance for project execution. Those details included developing a detailed project plan which includes a statement of work, defined project deliverables, use of a change control procedure, creating a work breakdown structure, developing a risk analysis with contingency planning, and a communications plan with customer/clients.

As we had worked with ESI to develop a Master's certificate in PM through the George Washington University, the assistant project manager was required to obtain satisfactory completion of three courses from the Master's Certificate curriculum. The next level was the project manager, and they were required to obtain the full Master's Certificate of seven courses from GWU. Their position descriptions were scaled up accordingly in terms of revenue, project complexity, and performance ability of the various soft skills required. The highest position defined was the senior project manager, and they were required to obtain the PMP certification from PMI.

If we were to do it over again, we would seek input from PMI's special interest groups (SIGs), perhaps participate in "blind" benchmarks with comparable companies, or work with university groups such as George Washington University's School of Business in their development. This might have actually accelerated their development by broadening the experience database drawn upon and give senior management a higher comfort level to approve the new structure. We probably could have made the case for the fourth level, program manager, at the same time rather than several years later.

Training. After developing the position descriptions and tying them to various levels of completion of the Master's Certificate in PM, it was a relatively easy step in concept to obtain general management support for the necessary training. The challenge was at the offset; there was no baseline to make recommendations for the funding and classes required since we had no idea whether we were talking about 300 or 3,000 who would be involved in the training. As the PMO did not own the funding for education, we did make recommendations for the timelines to complete those courses, but it was left to the project manager's supervisors to set the actual training schedule requirement due to organizational funding constraints and the individual's current project workload.

Middle Management Involvement Is Vital. Perhaps the major disappointment of the PM COE to make a strategic impact to Bell Atlantic's overall project performance was in not providing the corporate board members and senior management with the necessary background and instruction on the critical role for their support down to middle management regarding the project management workforce initiative. While there was great support from middle management for the major training initiative, their lack of understanding of their role and failure to set expectations for mandatory Microsoft project timelines, or to review risk assessments and contingency plans, and so forth, would become a significant handicap for project managers trying to exhibit this new behavior and develop the corresponding work products. Those that tried it within their organizations found middle management couldn't understand why things were taking longer to accomplish according to new processes. They often either overlooked or misunderstood the new reports. Worse yet, other project managers not following the new guidelines were not called to task and thus were indirectly being rewarded for bypassing the extra effort required. Our corporate vice president understood the problem and helped schedule my half-hour presentation on the PM COE to the corporate Board of Directors during their 1996 annual meeting only to have the presentation not make the short list when the three-day conference was cut by a full day.

Eventually, we made some limited progress on this point when we were able to get our CEO for Bell Atlantic to cosign, along with the president of ESI and the dean of George Washington University School of Business, a strong letter of support for the PM COE and the project teams to all his division presidents.

Staffing the PM COE. Another decision that limited the impact of the PM COE and its practical level across the corporation was in the level of staffing or lack thereof. The task force had made a recommendation to create a director and three senior staff positions for a proactive PM COE. The director's role was to manage the overall training program and provide metrics on progress made in professional certification and on the implementation of more rigorous project management processes, as well as establishing benchmarks for measuring project success while managing the other staff. The three staff persons were to rotate into the PMO on staggered six- to nine-month terms from the different organizations/silos to make independent critical assessments of ongoing projects via a standardized reporting system as well as provide mentoring to those projects that needed the help.

Timing is everything and Bell Atlantic was headed into a merger with its New England counterpart, Nynex, as we were forming the PMO. Consequently, there were headcount restrictions across the company, and the new PM COE was created with a director (me) and *no staff!* Thus, the proactive role and practical support became extremely limited.

32.6 OTHER SUCCESS STORIES

While there was success in establishing the PM COE, the formal training program, the three levels of corporate position descriptions, and more formal and standardized processes already described above, there were other positive outcomes, some of which will now be discussed.

32.6.1 "PM Lite"

Since most of the training focus was on our project managers' skills development, we ran into a problem of how would the rest of the project team members be trained, and how would we bridge the traditional gulf between the sales team and the implementation teams with a limited training budget? Since sales personnel traditionally "owned" the customer relationship, it was always difficult for the project manager to grab ownership of that relationship for the duration of the project. A coach of our Virginia-based network project managers challenged his team to fill the project team training gap, and they came through very professionally with a one day "PM Lite" course of theory mixed with practical exercise and terminology. Segments of the class could be used for a two-hour subset geared toward briefing new team members immediately before a joint project kickoff meeting.

ESI also helped close the training gap between sales and operations by partnering on a one day basics class for joint training of the two groups spiced with exercises designed to raise traditional issues leading to general understanding and consensus. Once those courses were completed, with sales VPs involved, the net result was a better understanding of roles during the project, with the PM in charge and obligated to communicate status and issues to sales. Sales personnel were relieved to spend their time selling new products and services.

32.6.2 Regional Network Operations Directive

Another initially negative event became a success story for the largest unit with project managers at Bell Atlantic. Upon completion of the Nynex merger with Bell Atlantic in early 1996, a new organization named Verizon was created. Not unlike other companies involved with major mergers, there was a scramble for corner offices between the two former Bell companies. My VP and corporate sponsor for the PM COE, John Gamba, retired, and the PM COE was on the verge of heading into the mist. I called Dave Douglas, the current VP of Operations in whose organization I had been hired two years before. He said, yes, he'd welcome the opportunity to take me back if I'd work closely with his directors to strengthen their operations processes and the project managers who execute them. I put one condition on the job acceptance, namely, that I'd be allowed to devote the equivalent of one day a week to sustain the PM COE for the company, and he said sure. Within weeks, this former BA organization which supported the southern region of the new Verizon, had adopted the following directive for project management:

Regional Network Operations (RNO)

Each director in RNO will be responsible for the following:

1. ***Direct the appropriate PM staff to complete the necessary training and/or certification within the two- to three-year timeframe.***
2. ***Review their existing staff for selection into the project management discipline using the official new position descriptions for guidance.***
3. ***Encourage and support appropriate PM staff to participate in local PMI chapters for their personal development.***
4. ***Along with the VP, Operations, and coaches of PM teams, attend a one day overview of the GWU professional development program for PMs to understand, support, and set realistic expectations of PMs.***
5. ***Accept the RNO PM Guidelines as the standard process for all RNO projects.***
6. ***Select a PM team leader to become knowledgeable about the PM guideline and act as the mentor within his or her district PM team.***
7. ***Insure each manager of PM teams will perform a PM self-assessment using the PM questionnaire developed by the PMC committee.***
8. ***Revise the salary structure to include a performance incentive.***

32.7 SUMMARY

Working with this self-empowered team of experienced project managers to influence the creation and structure of Bell Atlantic's first corporate PMO was the highlight for many of us in our professional career. We helped put the career path on a par with anyone in the industry and paved the way for the company to eventually be well positioned with their project manager professional certification credentials as the federal government is mandating vendors to have PMPs leading major projects. But regardless of the skill and experience of the project manager, and that of his or her project team, it requires the entire enterprise to be on the same page in understanding the value of project management and the role all employees have to play in the daily execution of their position in order for the enterprise to differentiate their products and services from the competition and achieve customer loyalty in the marketplace. With the Nynex merger grabbing the attention of the new structure of senior management, even after several visits, accompanied by ESI's VP, Sales, to the new Verizon power base at 590 Madison Avenue, New York City, I was unsuccessful in getting the PM COE office to regain the corporate sponsorship and achieve organizational project maturity. Perhaps, Verizon's merger with MCI and the challenge from the recent AT&T merger with SBC will drive the necessity of organizational PM maturity to fruition.

Postscript: After leaving Verizon in 1998 for a regional program manager position at Entex, a nationwide desktop and network management company (later purchased by Siemens), I returned to Verizon four years later to work in their non-regulated business unit focused on Large Business and Federal customers. The project management culture had thrived over those four years and expanded with the recent merger of MCI, which brought a very strong PM culture and track record for managing national and international projects. I'm now working in the Verizon Business unit for federal agencies, which has a PMO with several hundred project and program managers led by a vice president extremely supportive of his team and the value they are bringing to the company.

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