

SESSION 7

PROJECT PLANNING

IMPORTANCE OF PLANNING

Introduction

Planning is a rational approach to the future. It involves selecting in advance, from alternative courses of action, what to do, when to do it, and who is to do it. Planning bridges the gap from where we are to where we want to go and helps ensure that we reach our goal economically and on a desired and predetermined time scale, making the most effective use of the resources available.

Project planning involves a series of actions required to properly define, charter, organize, and staff a designated project. It includes establishing sequence of work, estimate of resources needed, estimate of costs, and estimate of durations. It involves selection from among alternative courses of action. Planning is necessary and important in the control of projects because:

- A project plan helps prevent a breakdown in communications in today's complex projects.
- A plan is absolutely essential for timely completion.
- A plan helps make optimum use of available resources including capital and provides unity of purpose.
- A workable plan helps to minimize and contain risks.
- Through planning, sequential and interdependent activities can be more efficiently executed.
- A plan provides a basis to initiate alternate courses of action and solutions to unforeseen exigencies.
- The availability of a plan permits management by exception.
- The existence of a plan provides continuity and minimizes the impact on transient situations.
- The existence of a plan provides evidence to validate claims relative to project performance.

Project Planning Definition

A project is a related group of activities which study something, build something, change something, or otherwise accomplish some defined objectives. A project is a project whether it is planned or not. However, it should be planned in order to meet objectives on time, within budget, and to technical specifications.

Today we live in a project-oriented work environment. Much work is carried out as a project which means that facilities to be constructed or objectives to be met are generally well defined and that efforts are made to reach these objectives over a specific period of time and within certain cost parameters.

This portion of this Skills and Knowledge workshop will concentrate on the planning of and execution for such projects.

Notes:**ORGANIZATIONS FOR PLANNING****Introduction**

As found in almost any organization that handle projects, there are divisions or groups which are generally classified as being an operating (or line function) or part of a service or staff function. This may not be true in manufacturing or organizations which handle single products. In the operating arena of the project oriented, individuals so assigned make a direct contribution toward the company's primary objective and are said to have line authority. On the other hand, individuals assigned to so called staff or support functions help those with line authority to perform their work by providing advice, information, and/or some type of service.

The manager of an assembly area and the supervisor of electrical design are generally said to have a line function while those in Accounting, Personnel Administration, or Project Planning are not part of the primary chain of command and thus are examples of service personnel and are part of service organizations. In many manufacturing and construction companies, however, engineering is considered a service to the manufacturer or construction and thus not a line function.

Project Organization

In a project type organization, individuals are drawn from line and staff functions to achieve a specific objective such as completion of job within technical specifications, on time, and within budgets. These individuals, however, maintain their ties with their operating and staff organizations for administration and some technical direction. Thus, it is not uncommon for planning personnel to be assigned to a project where a project manager will provide day-to-day direction as to *what* is to be done while the same planning personnel will look to their "home" division or group for direction as to *how* it is to be done. Such an arrangement is said to be a matrix type organization.

Notes:

WORK BREAKDOWN STRUCTURE (WBS)

Introduction

Project planning is most effective when the project scope of work is completely and well defined. The scope of work of a project is generally assembled from a variety of sources including a request for proposal (RFP), a proposal in response to an RFP, the negotiated contract, discussions between contractor and owner, etc.

A WBS, which is a product or product-oriented family tree breakdown which graphically portrays all of the work necessary to achieve the project's objective is the preferred management tool for organizing work into manageable packages of work. It provides an ordered framework for planning and controlling the work efforts to be performed in achieving technical objectives, for summarizing data, and for the preparation of the quantitative and narrative reports used for monitoring cost, schedule and technical performance.

A WBS is developed by first identifying the major end items or systems to be produced, followed by their successive subdivision into increasingly detailed and manageable subsidiary products. Detailed task descriptions are often prepared for each product on the WBS at the level where work will be performed. These task descriptions could identify the product to be produced, describe the effort to be performed, identify the resources to be applied, specify the budget and schedule constraints, the technical requirements, and identify the organizational element responsible for work accomplishment. A compilation of these task descriptions along with the WBS makes up the Scope of Work (SOW).

In the litigious society we live in today, what is understood to be excluded in a SOW is just as important as that which is understood to be included. Thus, each task description of the SOW should be "bounded" with inclusions and exclusions and should be described to the level of detail that the understanding of the job permits. Further, it is important that the SOW should be specific as to the end product, i.e., identify by name and/or the number of drawings, and specifications, reports, estimates, schedules, etc., that are to be prepared and the frequency of issue of such products.

Work Packages (WP)

Once the scope or work is defined and reflected into a WBS, the project selects a level where the project will be managed and controlled. This is called a WP level and is made up of WPs. A WP is a manageable piece of work from the standpoint of scope (not too big and not too small) cost (not too low and not too high) duration (not too long and not too short) and is generally performed by a single organizational element.

WPs constitute the basic building blocks in planning, controlling, and work performance. A WP should be a natural subdivision of effort planned according to the way the work will be performed and is scoped, in general, to match the organizational setup. The WP serves as a vehicle for monitoring and reporting progress of work. A WP has the following characteristics.

- It represents a unit of work at levels where work is performed.
- It is clearly distinguished from any other WP.
- It is assignable to a single organizational element and cost account.
- It has scheduled start and completion dates and interim milestones, as applicable, all of which are representative of physical accomplishment.
- It has a budget or assigned value expressed in terms of dollars, labor hours, or other measurable units.
- Its duration is limited to a relatively short time span or it is subdivided by discrete milestones to facilitate the objective measurement of work performed.
- Its duration can be integrated with higher levels of schedules.

Estimating

The WBS provides a systematic approach to cost estimating that ensures relevant costs are not omitted. An estimate derived by WBS element helps project management to monitor, coordinate, and control the various project activities planned or underway. Other sessions of this workshop discuss estimating in greater detail.

Notes:

CODE OF ACCOUNTS

Introduction

Each WBS element is assigned a code to be used for its identification throughout the life of the project. A simple decimal or alphanumeric coding system is applied that logically indicates the level of an element and relates lower level supporting elements to their parent upper level element. Through extension of the coding system, WPs can be related to the WBS elements they support and other cost segregation objectives.

Cost Accounts

The assignment of lower level WBS elements to responsible lower level functional managers provides a key point for management control purposes and cost collection. The lowest WBS level at which organizational responsibility for individual WBS elements exists is referred to as the cost account level.

Cost Account Systems

A firm's cost account system must identify and accumulate costs in accordance with the way the budget was distributed using acceptable recognized costing techniques and must be able to be segregated and summarized by organization and by WBS element. The coding and intelligence built within an accounting system (Code of Accounts) provides the mechanism which permits schedule activities to communicate with WBS elements and organization.

Every firm has its own unique cost account structure and any specifics regarding such a structure are beyond the scope of this workshop session.

Performance Measurement

At the cost account level, actual costs are accumulated and variances are identified, and performance measurement is conducted. The data elements, budgeted cost for work scheduled (BCWS), budgeted cost for work performed (BCWP), actual cost of work performed (ACWP), budget at completion (BAC), estimate at completion (EAC), and variances, which can be determined at the cost account level, can be summarized up through both the WBS and the organizational structure for reporting to higher levels of management. These data elements, BCWP, BCWS, ACWP, BAC, EAC, and the earned value concept will be discussed at another session.

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PLANNING LOGIC

Introduction

Planning logic refers to the determined order in which the activities are to be accomplished. The start of some activities obviously depends on the completion of others. Yet, many activities are independent of one another and can proceed concurrently. Much of job logic follows from well-established work sequences that are usual and standard in the business. Nevertheless, many portions of any sizeable project could be performed in more than one sequence. It is the planner's responsibility to identify the workable choices and select the most suitable alternatives.

Planning Logic and the WBS

A WBS is a family tree hierarchy of the products requiring work to be performed in accomplishing the end objectives. Unlike a genealogical family tree, however, the products on the lower branches are produced earlier in time than those above. This facilitates the planning and scheduling process, since the elements on the lower levels of the WBS are planned and scheduled for completion before those one level above. Products that result from work efforts may be hardware (facilities, reactors, steam generators, etc.), services (project management, project planning), and data (technical reports, engineering data, management data, etc.). A WBS serves as a bridge between the end objective and its supporting efforts and is planned accordingly. It depicts work products in the manner in which the work is to be accomplished and provides much of the logic and conceptual framework for planning and controlling the work.

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PLANNING INFORMATION SOURCES

Introduction

After the scope is fairly well identified, planning personnel from the planning organization develop a Critical Path Method (CPM) plan and schedule for accomplishment of the SOW, and any key milestone dates obtained from the contract, proposal, letter of intent, or as established by the Project Manager.

Projects normally have available on a full-time or part-time basis the services of professional planning personnel whose function is to assist those responsible for doing the work to develop the plan and schedule for its accomplishment.

Principal sources of information for establishing the planning logic and duration that go into the plan and schedule include the WBS and SOW as discussed above, historical data from similar projects, judgmental input from those responsible for performing the various portions of the work, etc.

Personal Contacts

Personal contacts with those responsible for work performance is a key source for planning information in project planning and is an absolute must in the development of a realistic plan and schedule. It must be the plan and schedule of those responsible for task completion and acknowledged as such--not that of the planning engineer. The planner achieves this acceptance through aggressive and persistent--but diplomatic--questioning, making suggestions, proposing alternatives, challenging sequence of work operations, estimates, durations, and resource needs, conveying his knowledge and experience from past or similar jobs, and otherwise "forcing" the person or persons to whom the planner is assisting to realistically plan and schedule the work.

The planning engineer then assembles this information from the various sources into an acceptable format (perhaps the CPM network) reviews it with those responsible for work scope performance and through an iterative process, has the plan and schedule accepted as the project plan of the individual or group responsible for work scope performance that will thereafter provide the basis for project execution.

Notes:

PLANNING PRODUCTS

Introduction

Schedule awareness and schedule discipline are greatly influenced by an individual's ability to read and understand the scheduling document with which he or she is required to work. Aesthetics play an important part in schedule comprehension. Thick computer printouts are often shunned by the senior managers but may be a necessary tool for the planning engineer and, in some cases, the lead engineers and craft supervisors as well. Management generally prefers graphics over printed matter for schedule visibility and the higher the management level, the more summarized such schedule visibility should be.

Levels of Schedules

Thus, the products of planning include at least one CPM network schedule but more often than not result in a hierarchy or levels of schedules, none of which are independent of each other. Such other schedules could include summaries of a base schedule, those at a lower level in greater detail, material schedules, manpower utilization, equipment usage, cost account schedules, punchlists, etc.

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