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# LEARNING AND INNOVATION IN HYBRID ORGANIZATIONS

Strategic and Organizational Insights

Learning and Innovation in Hybrid Organizations

Paolo Boccardelli · Maria Carmela Annosi
Federica Brunetta · Mats Magnusson
Editors

# Learning and Innovation in Hybrid Organizations

## Strategic and Organizational Insights

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# 1

# Strategic and Organizational Insights into Learning and Innovation in Hybrids and "New" Organizations

Maria Carmela Annosi, Federica Brunetta, Mats Magnusson and Paolo Boccardelli

## 1.1 Motivation

Megatrends, such as technological breakthrough, climate change and resource scarcity, rapid urbanization, shifts in global economic powers, and demographic and social changes (Pwc 2016), as well as

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collisions between them, are reshaping the economic and commercial landscape.

These new forces of change are leading to hypercompetition and characterizing the new competitive landscape worldwide. Hypercompetition has also imposed shorter periods of advantage punctuated by recurrent disruptions (D'Aveni 1994). Jointly with changes in digitization of industries (e.g., IoT and Industry 4.0) and economics of automation, companies are rethinking organizational structures, influence, and control. New organizational challenges arise while companies work on the destabilization of roles, tasks, and identities; thus, they move more quickly and experiment using means new to the traditional approach to embrace organizational changes.

New organizational forms have been adopted by many firms in order to cope with the higher rate of change whereas in a low-intense and moderate-intense competition, companies have relied on unique and difficult to transfer routines as part of their core competence. In this environment, changes cannot be forecasted but only answered with more or less efficiency ex post (Volberda 1996). This dynamic process demands new organizational forms that could be able to "explore new opportunities effectively as well as exploit those opportunities efficiently, to change their strategic focus easily as well as develop some strategic direction and to change their dominating norms and values" (Volberda 1996).

The idea of "Hybrid organizing" has emerged in literature, prompting a call for understanding the renewed process of exchange, collaboration, and technological management that has changed organizational structures. Hybrid organizations combine multiple organizational forms that constitute a deviation from the traditional templates, and thus experience unique organizing challenges, in terms of activities, structures, processes, and meanings (Battilana and Lee 2014).

These socially complex settings can be thought as layered as any activity requires the collaboration and integration of different practices and entities across and within organizations (Carlile 2002), despite the lack of traditional hierarchical structures or routines. Thus, moving beyond existing organizational arrangements, firms face the need to engage in new ways to experiment, learn, or do bricolage, with actors interacting differently and organizing being reconceptualized.

Substantial further research is still needed on how to design and manage organizations that can respond to the uncertainties and demands of hypercompetitive environments (Ilinitch et al. 1996). Thus, the purpose of this book is to discuss processes and practices of learning and innovating across hybrids and "new" organizations. In order to maintain multiple perspectives, the editors have invited scholars from different disciplinary backgrounds and with different theoretical lenses to analyze these issues.

The intent of this book is to provide some strategic and organizational insights into hybrid organizations and their learning and innovation capabilities. As these dimensions stand at the core of the hybrid organization design, this book analyzes the dynamic relationship between organization and innovation from three different interdependent perspectives: (i) management of innovation, learning, and value creation; (ii) structural and strategic issues arising while innovating in hybrids and "new" organizations; and finally (iii) how hybrids and new organizations can respond and adapt to strategic and organizational change.

The concept of hybrid organization and, more generally, a new organizational form relying on flattened structures are presented in this book, with practice in mind. Hybrid and "new" organizations can be quite different and present different degrees of complexity in comparison with traditional organizations. The different contributions contained in the book detail structures, processes, layouts, and activities by which firms use and match elements of diverse organizational forms.

The definition of hybrid and "new" organization design will be provided by using some qualitative and quantitative research results which will be presented first by means of some examples then by theorizing about the research results analyzed within the chapters.

Hybrid and "new" organizations' innovation activities create unique challenges, given that these firms combine multiple organizational forms, and are subject to internal and external tensions. Therefore, hybrids are by nature arenas of contradictions, and it is possible to identify the presences of inconsistencies in the explained models. After giving a small summary of the various chapters in the next section, an introduction to the definition of hybrids and its known relation with innovation will be proposed.

The book is organized around examples. Most chapters include a new example together with the needed introduction to allow readers to understand the embedded concepts. Of course, such concepts are not recurrent from one chapter to the other despite they are, from time to time, more refined. As a matter of fact, each chapter is an almost independent essay.

## 1.2 Presentation of the Chapters

The chapters in this book are grouped into three sections, recalling the three different interdependent perspectives underlined above:

- Innovation, learning, and value creation;
- Innovating: structural and strategic issues; and
- Adapting innovation and learning to strategic and organizational change.

### 1.2.1 Innovation, Learning, and Value Creation

The first section of the book groups four studies related to the management of innovation, learning, and value creation. The first contribution, by Sherwani and Tee, is related to "*Innovation and Value Creation in Business Ecosystems*." The aim of this chapter is to focus on how firms manage knowledge integration in business ecosystems, and how the strategic management of various interdependencies affects innovation and value creation in business ecosystems. Chapter 3, by Vicentini and Nasta, entitled "*Team and Time within Project-Based Organizations: Insights from Creative Industries*," analyzes the performance of project-based organizations by focusing on temporary organizational forms. The authors use the theoretical perspective of the integrative framework of Bakker (2010) which relies on four main themes (task, team, time, and context) and analyze to what extent these four themes affect the performance of Project-Based Organizations (PBOs) that play in TV drama series industry and music industry. Chapter 4, "*Collaborative Spaces and Coworking as Hybrids Workspaces: Friends or Foes of Learning and Innovation?*" written by Marchegiani and Arcese, aims to analyze coworking as a promising new model of work. Coworking allows interactions potentially leading to an innovative outcome, both in terms of business development and organizational innovations, which are instrumental to business growth.

Finally, the last contribution of this section is Chap. 5, "*Investigating the Impact of Agile Methods on Learning and Innovation*" written by Annosi, Hemphälä, and Brunetta, which investigates the impact of Agile methods on the process and product innovation and on the process and product learning of self-managing teams operating in new product development setting.

### 1.2.2 Innovating: Structural and Strategic Issues

The second set of studies is dedicated to the understanding of structural and strategic issues that may arise in the quest for innovation. The three proposed contributions are framed within network studies, confirming how networks have become loci of innovation (Powell et al. 2005).

Chapter 6, a theoretical contribution from Brunetta, Boccardelli, and Lipparini "*The Role of Networks for Innovation in Temporary and Project-Based Organizations*", addresses some of the critical issues related to a better understanding of how diverse network structures impact on scientific performance. It builds on the results of a 5-year research project in which the authors have analyzed several different R&D networks. By discussing about "optimal" network structures for temporary and project-based organizations, it prepares the ground for Chap. 7, by Magnusson, Mascia, and Di Vicenzo "*Project Social Capital in Biotech R&D: Configuration and Impact on Knowledge Development*". The aim of this chapter is to empirically investigate the role of project social capital in the knowledge development of R&D projects within the biotech field and to identify certain structural configurations of project social capital maximizing the level of effectiveness in knowledge development.

Finally, Chap. 8, by Iacopino, Mascia, Monti, and Cicchetti "*Professional Networks and the Adoption of Medical Technologies: An Empirical Study on Robotic Surgery*," also empirically analyzes networks. More specifically, the aim of this chapter is to highlight the significant role played by internal and external social networks in the process of adoption of new technologies, suggesting that contagion and knowledge exchange should enhance the diffusion of innovation within health care organizations

### 1.2.3 Adapting Innovation and Learning to Strategic and Organizational Change

Innovation is inherently associated with change; hence, the final part of this book includes the contributions related to the development of specific organizational solutions or firm's capabilities to adapt the innovation and learning process in the light of strategic or organizational change. This section includes six contributions. The first one, Chap. 9, is a study by Giustiniano and Cantoni, "*Between Sponge And Titanium: Designing Micro and Macro Features for the Resilient Organization*," that aims to illustrate the design of organizational resilience by providing indications for contextualized macro- and micro-configurations to tackle the external uncertainty and equivocality. Then, Chaps. 10 and 11 discuss the role of controls in the context of Agile. Within Chap. 10, "*Issues of Control in Hybrids and 'New' Organizations,*" Annosi, Brunetta, Magnusson, and Boccardelli, given a dearth of theoretical explanation for how controls, in the new organizational context, operate in combination, review the current understanding of the organizational control underlying the self-regulative learning processes. Annosi et al. investigate the micro-, meso-, and macro-level of controls acting on the self-managing teams and clarify the reason of team's behaviors and their influence on both teams' innovativeness and learning performance. In Chap. 11, "*Investigating the Impact of Agile Control Mechanisms on Learning on Scrum Teams*," Annosi, Martini, and Magnusson explain how the regulation of self-managing teams occurs. Empirical materials are deployed to illustrate how managerial controls operate, more or less intentionally and in/effectively, to shape employees' cognition and behaviors in an Agile context.

Agile and agility are also at the core of the following two chapters. Giustiniano, Pina e Cunha, Neves, and Rego, in Chap. 12, "*Improvising Agility: Organizations as Structured-Extemporaneous Hybrids*," look at the Agile organization as a paradoxical combination of structure and extemporaneity and discuss agility as an organizational property to analyze through three elements: improvisational leaders, followers, and context. In Chap. 13, "*The Emergence of New Organizational Designs: Evidences From Self-Managed Team-Based Organizations*," Annosi, Giustiniano, Brunetta, and Magnusson explore, through a study of the organizational design practices of different R&D organizations applying Agile principles, how organization design becomes a primary source of collective commitment to a collaborative process for the new product development.

Finally, Chap. 14, "*Lean Start-up in Established Companies: Potentials and Challenges*" by Goduscheit, explores the employment of the lean start-up approach, which is an emergent perspective on how entrepreneurs can bring new products and services to the market. The chapter presents some initial findings from seven case studies of companies.

## 1.3 Hybrids and "New" Organizations

Hybrid and "new" organizations are becoming prevalent in modern societies (Kraatz and Block 2008; Economist 2009).

The notion of "hybridity" refers to the state of being constituted of disparate parts. Particularly, hybridity denotes a composition from existing elements. In this light, there are two principal definitions of "hybrid" organization in the extant literature. The first derives from Powell's (1990) "neither market nor hierarchy" conceptualization of a "hybrid" organizational form. The other definition is the aggregation of public and private organizing logics through mission-driven businesses, social enterprises, cross-sectoral collaborations, and public–private partnerships of different types (Battilana et al. 2012). Thus, by definition, hybrid organizations combine peculiarities and aspects of diverse organizational forms (Haveman and Rao 2006; Hoffman et al. 2012; Jay 2013) and may involve the contextual presence of multiple institutional logics related to behaviors, values, means, and goals (Lounsbury 2007; Thornton and Ocasio 2008). Within the realm of innovation, hybrid organizations might be considered, due to their nature of "combined" forms, as "loci of disorder," and, thus, of creativity (Battilana and Lee 2014), although managing tensions, as in the exemplified case of Agile organizations, may lead to inertia or small oscillation between the logics of efficiency and innovation. This issues related to the idea that hybrids face various and potentially conflicting institutional demands deriving from their environment and constraining the way they operate (Greenwood et al. 2011; Thornthon et al. 2012).

This book is also engaging in the discourse of how learning and innovation are developed in "new" organizations, and by following Daft and Lewin (1993), the editors comprise here those new paradigms that have substituted the traditional hierarchical organization, and the bureaucratic structures and driven firms toward the idea of flexible forms, favoring continuous change, learning, and problem-solving through coordination, interconnection, and self-organizations. As in the case of hybrids, "new" organizations face a multiplicity of logics and tensions, as they comprise forms with "flatter hierarchies, decentralized decision making, greater capacity for tolerance for ambiguity, permeable internal and external boundaries, empowerment of employees, capacity for renewal, self-organizing units, and self-integrating coordination mechanisms" (Daft and Lewin 1993, p. i).

While extant research works have advanced our understanding of the internal and external difficulties faced by organization moving away from the traditional designs, highlighting how the organizational form can be seen as a strategic variable (Daft and Lewin 1993) opens up new sources of sustained competitive advantage; the issue of how these forms can help achieve learning and innovation goals is still open for discussion. Designing hybrid, flexible, and adaptable organizations can be a strategic response to hypercompetitive environments and to the need to continuously learn and innovate.

This book tries to fill this gap by proving evidence for the factors associated to the firm ability to achieve high innovation performances, following the overall approach to investigate how organizations respond to tensions at the internal and external levels.

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# Part I

## Innovation, Learning and Value Creation

# 2

# Innovation and Value Creation in Business Ecosystems

Hassan Sherwani and Richard Tee

## 2.1 Introduction

Business ecosystems are an emergent type of organizational form that can be defined as “the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize” (Kapoor and Adner 2012). Gulati et al. (2012) have identified such ecosystems as a novel type of organizational form, which combines open membership boundaries with a highly stratified and more hierarchical decision-making. Such new organizational forms are increasingly important in highly competitive global industries (Ilinitch et al. 1996; Volberda 1996). Examples of these managed ecosystems include Apple’s iOS app store and the Google’s Android Smartphone operating system. In both cases, membership to each ecosystem is open to any firm or

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individual that wants to develop applications for it. At the same time, actors operating in such ecosystems need to ensure that knowledge is generated and transferred. Therefore, a key issue for firms operating in business ecosystems is how to manage knowledge integration, which impacts the rate and degree at which innovations arise and value is created. This chapter focuses on how firms manage knowledge integration in business ecosystems, and how the strategic management of various interdependencies affects innovation and value creation in business ecosystems.

## 2.2 Background Literature

### 2.2.1 Business Ecosystems

The term "ecosystem" has been of rising interest in discussions of strategy (Moore 1993; Iansiti and Levien 2004; Clarysse et al. 2014; Kapoor and Adner 2012). Businesses are moving toward a more networked approach which creates new opportunities as well as subsequent challenges (Adner 2017). Hence, this idea of ecosystem has sparked a rising interest among innovative organizations. It has raised awareness for firms in terms of how ecosystems affect their business models and value networks (Christensen and Rosenbloom 1995), thereby attempting to improve overall value creation and value capture.

The ecosystem is a term that has been taken from biological sciences, which in a business context refers to interdependent networks of organizations. As in the case of biological ecosystems, each member would depend on other members for its own survival and so learn to participate and contribute to the overall system. This scenario becomes relevant in the business context where the survival, growth, and success of each organization is affected by the ecosystem holistically (Iansiti and Levien 2004). In business, ecosystems outline the network of firms which collectively create an overall integrated technological system for creation of value for customers. Understanding the mode of ecosystems in which their operations change may provide useful information for firms that lie or associate themselves within these networked environments (Mäkinen and Dedehayir 2012).

According to Moore (2006), markets, hierarchies, and ecosystems are the three main components of the contemporary business. These pillars, therefore, should provide the basis for companies to compete, regulate policy, and counter negative or antitrust actions. Most companies tend to adopt this approach; however, haphazard adoption may create issues. There is a confusion related to boundary, overlap, redundancy, applicability, unit, and focus for analysis (Kapoor and Adner 2012).

According to Moore (1993),

> An economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world. The economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organisms also include suppliers, lead producers, competitors, and other stakeholders. Over time, they co-evolve their capabilities and roles, and tend to align themselves with the directions set by one or more central companies. Those companies holding leadership roles may change over time, but the function of ecosystem leader is valued by the community because it enables members to move toward shared visions to align their investments, and to find mutually supportive roles.

To elaborate this idea given by Moore (1993), business ecosystems are a network of interdependent organizations that coordinate each other in order to create success. Traditionally, companies are considered to be rivals who fight each other for a maximum market share. This concept of corporate rivalry has been contradicted as organizations in modern times work in a different environment. Competition has different meanings. Firms tend to integrate competition and cooperation so that they could produce more diverse value for the end customer. This practice is important for competitors as they could rely on other firms in order to survive. It is worth noticing that business ecosystems consist of actors (Moore 1993), who participate within the organization. In addition, distribution channels and suppliers are considered part of the system as well. There are certain extended participants such as customers, standard bodies, and suppliers of complementary products. There are some actors who are thought to be an external influence on the system; however, they have an impact on the main functions of business. Examples are trade partners, unions, key investors, and regulatory bodies.

As mentioned earlier, the ecosystem describes an environment containing an organization. Though similar, the business environment and business ecosystems are not same. It is also significantly different as it refers to the systematic nature of the total environment and key components making up that system. The ecosystem also addresses the internal evolutionary process through which an organization must go, adoption capability of the firm in a transition period, and coevolution of a business firm and its external environment. According to Hagel and Brown (2005), a business ecosystem may be able to explain a specific type of environment. In this case, clusters of companies focusing a specific type of business or technology might decide to locate their operations in close geographic proximity to each other.

To understand the role and dimension of the business ecosystems, companies comprising these may be diverse and unique in terms of their capabilities. However, they have come closer due to this business collaboration. An organization may go through intensive development of its infrastructure first to be competitive. This infrastructure includes various activities such as finance, accounting, legal issues, deployment of sales and marketing units, recruitment at executive and mid-level, and maintenance of relations with other partners. Through this consistent process of infrastructure development, there could be a chance of building up links within different units and departments. Now, consider this scenario at a bigger level where there are more number of companies and each organization acts like an actor at the individual level. The same phenomena of organizational structure will be followed but at a higher level. In this scenario, other institutions such as research centers, universities, governmental organization, and nonprofit organizations may serve an extra blend of network interaction (Hagel and Brown 2005).

The role of business ecosystems is to surround, permeate, and reshape given markets and hierarchies (Moore 2006). Most companies in modern competitive environment emphasize efficiency and effectiveness as the basis of innovation. Profit margins are still important but they are not the only criteria to compete. In addition, companies have realized that they cannot change the system by individual approach, and innovation phenomena remain incomplete without collaboration with other companies. Firms embrace business ecosystems in order to coordinate innovation through a continuous evolution of multiple markets and hierarchies (Moore 2006). This provides a win-win scenario for customers as they could get maximum benefits through innovation. Furthermore, there are complementary innovations that need to be coevolved across company lines because there is no way that one firm could achieve all required knowledge, technical resources, and managerial skills to fulfill the demand.

Organizations may decide to coordinate together but, at the same time, may wish to keep a certain level of autonomy. Therefore, there is a need for an organization whose agents are themselves legally autonomous and not linked through employment relationships (Gulati et al. 2012). Hence, such ecosystems have been identified as a novel type of organizational form, which combines open membership boundaries with a highly stratified and more hierarchical decision-making. An agent could be an organization in itself; however, it can be taken as unitary actor for the purposes of analysis and this type of legally autonomous organization is called meta-organization. It may consist of networks of organizations or even individuals who are recognized by a system-level body, however; they are independent of authority-oriented employment relationships or contracts. These networks do not mean that organizations within this network would have unified goals.

Each organization may have their own goals; for instance, improving production quality system could be important for one firm. Yet, another firm might prioritize managing the levels of sales. Ecosystems allow each firm to fulfill its need under a unified network where it is not necessary for constituent agents to share it. This is just like a traditional organization system in which individuals are free to have their own priority. Hence, the meta-organizations comprise of networks of firms where each agent has its own motivation, goals, and incentive systems. These organizations are still different from traditional business setting. The meta-organizations are associated through authority-based contracts (Gulati et al. 2012). These contracts make all actors inside this infrastructure independent of each other at the firm level. They are connected through a network that allows them to stay connected and have full autonomy.

To understand this concept, consider communities of economic agents where individual business activities could measure the overall community market value. For example, tech firms that make services for Apple iPod. They can be taken as iPod business ecosystem. Another example is entertainment companies that choose to license music through iTunes or iPod connected music sites. In other words, a business ecosystem can also be conceived as a network of interdependent actors that collaborate and innovate (Moore 2006).

### 2.2.2 Collaboration and Knowledge Integration

Ecosystems and collaboration process seem a win-win for all. However, there could be some issues that could lead to undesired results. One of the main concerns in this network approach is knowledge complementarities. This can create interdependencies that need to be resolved (Thompson 1967). At one end, knowledge adds a great part in value creation, however; there could be serious barriers in the process of transfer and replication of knowledge. Hence, knowledge utilization matters. It is worth noticing at this point that it, in a broader sense, represents both 'explicit' knowledge and 'tacit' knowledge. Explicit knowledge refers to that which can be written down, whereas tacit knowledge cannot (Grant 1996; Kikoski and Kikoski 2004; Nonaka et al. 2000).

To further elaborate this concept, explicit knowledge is described as what can be encapsulated as a language or even a code. This coding style allows organizations to communicate, process, and store this set of knowledge conveniently. One example of explicit knowledge is patents or copyrights (Dalley and Hamilton 2000). Through this process, explicit knowledge becomes a direct asset for the organization. On the other hand, tacit knowledge is personal and hard to be codified and formalized, which is rooted in actions, procedures, commitment, value, and emotions (Kikoski and Kikoski 2004). Tacit and explicit knowledge are both complementary, which means that both are equally required for knowledge creation. Knowledge is created through interaction between tacit and explicit and not from either tacit or explicit knowledge alone. However, competitive advantage is achieved by the organization through tacit knowledge because explicit knowledge is known to each and every individual.

The significance of knowledge is described by Polanyi (1969) as the knowledge that is considered to be better explained than said. As far organization is concerned whether a newly born start-up or an established market player, every individual associated with the firm has a unique set of skills. These skills are like an asset for the company, and every firm wishes to translate these skills into knowledge. The problem is that one cannot codify these skills as they come along the hard way of individual's focus, training, and experience. Others could learn them through the process of keen observation. In terms of an organization, whether it is a large company or a start-up, each individual possesses skills that are unique and, once unlocked, can be a creative contribution in an organization (Kikoski and Kikoski 2004).

It is important to notice that tacit knowledge plays its role indirectly in innovation, and hence, it is very significant at organizational or even network level. This type of knowledge helps organizational activities and functions by creating new knowledge. This knowledge is called new as it has been extracted from skills and competence of individuals or group working within an organization. This knowledge plays its role in various applications such new product development, novel business concepts, and procedures. All of these are the outcome of tacit knowledge and its adoption, and these end results are the reason for innovation. Hence, tacit knowledge enables each skilled individual to contribute through novel ideas and concepts. In addition, it provides beneficial knowledge at personal level that is available to others (Alwis and Hartmann 2008; Kikoski and Kikoski 2004). This is the same in a network scenario where new companies learn a lot from market dominant players that would have not been possible without translating tacit knowledge in that respective ecosystem.

Knowledge management is directly related to the capability of any firm toward its information processing ability. Information processing setups are very useful in knowledge utilization within firms (Tushman and Nadler 1978). They could be very interesting in these business networks and ecosystem context. Information processing consists of information gathering, information interpretation, and information synthesizing. These all components act as a process of knowledge integration within an organization.

Knowledge conversion is an essential aspect for any enterprise (Nonaka et al. 2000). There are four modes of knowledge conversion:

1. *Socialization* From tacit knowledge to tacit knowledge,
2. *Externalization* From tacit knowledge to explicit knowledge,
3. *Combination* From explicit knowledge to explicit knowledge, and
4. *Internalization* From explicit knowledge to tacit knowledge.

Knowledge created by this spiral process can be valuable, as this created knowledge moves along the system (Nonaka et al. 2000). Tacit knowledge can be challenging as it comes through experience, and it can only evolve through more experience. This could be time-consuming and takes place through trial-and-error procedures. Different companies use different methods toward socialization (e.g., the Kanban model in software development companies). The benefits of tacit knowledge are obvious, and hence, it should of high priority for organizations to motivate the creation of tacit knowledge (Alwis and Hartmann 2008).

Knowledge sharing and transfer can be more complex in ecosystem networks as companies may not share the same motivation, and they might contain some information within the walls of the respective organization. At an internal level of the firm, knowledge integration is significant as an individual does not possess enough cognitive power to contain all of it. Hence, it is not feasible for each individual and his/her ability to understand and learn the knowledge given by other specialists (Grant 1996). That is why knowledge is shared in an organization.

Replication of knowledge integration across a meta-organization is rather difficult. In the case of explicit knowledge, it is not easy to keep this knowledge safe enough through copyrights or patents. We observe many patents dispute in the regular business setting. It is hard for a start-up especially to open up its explicit knowledge toward a network that openly. Most technological firms tend to be careful about sharing particular types of knowledge. As that knowledge and those tools are the only assets they possess, and hence, they try to protect them. Joint ventures are one example where organizations do share knowledge more freely, and as there is a win-win for both, they tend to cooperate more.

As far as tacit knowledge is concerned, it is even harder due to difficulty in knowledge transfer level. Companies within an ecosystem may have uneven market information and different levels of hierarchy. For understanding integration process with tacit knowledge in consideration, there are two mechanisms. One is related to identifying direction through which knowledge would be communicated between specialists and specialists in some other fields (Demsetz 1991). For example, British Airways has global aircraft maintenance facilities. These main maintenance facilities include service and repair that are handled by a specialized host who is familiar with procedures and directives based on Federal Aviation Authority. Others services such as guidance and technical information are given by manufacturers. Hence, these rules, formulae, expert systems directives, policies, and procedure are tackled by a number of specialists and how they communicate to either nonspecialists or those who are familiar with other aspects.

In other words, direction refers to codifying tacit knowledge into explicit rules and instruction that are useful for those who have partial or no knowledge. There is an issue, however. As Polanyi (1966) describes that there is a danger of losing some important knowledge in the process of this transition. "We can know more than we can tell." Hence, converting tacit knowledge into explicit knowledge as a form of rules, directives, and policies could cause a certain degree of loss.

The second mechanism is organizational routines. This fills up the potential issues associated with direction mechanism. According to March and Simon (1958), organizational routines touch on a mechanism for coordination which is independent of the need for communicating the knowledge in explicit form at all. It could depend on a number of activities by developing a fixed response to already defined response or stimuli. In this process, an individual may develop a certain pattern through which they may interact. This interaction allows the integration of their respective specialized knowledge without being converted to explicit knowledge. This certainly has an advantage over direction by having a great capacity to vary responses to a wider range of situation. In addition, it could be more economic to apply in any organization or even in a network instead of documenting all the knowledge. This mechanism needs strong coordination though.

As this is an informal procedure, it could not work in the absence of interaction among teams, commonly developed roles, and training (Pentland and Rueter 1994). This might work as a disadvantage for those companies who are not into an interactive environment and team building process. Another problem is that in the case of new collaborations, there is a need for the same training of constant repetition and processes that could be time-consuming. In the long term, this could help in harnessing knowledge effectively, and integration could be a smoother procedure once firms could develop an interactive environment around this (Grant 1996).

According to Tushman and Nadler (1978), knowledge processing within a firm could be comprised of three components. They are knowledge gathering, knowledge interpretation, and knowledge synthesis. Every component acts as a stage. At first level, knowledge is collected through individuals and teams in an organization. This process of information gathering remains same in business networks context as well. The data could be collected from given and desired organization where teams or individuals participate. This information is taken as exploration. At this stage, given information does not have much of meaning. At the second stage of knowledge interpretation, this knowledge starts getting used. At this final stage of knowledge synthesis, knowledge is exploited for the benefits of business ecosystems around knowledge hubs.

Knowledge interpretation is a process where information is processed and is valued. It is important to know what set of information is valuable for a network and what information is not. Some of the data are discarded at this level. In the third stage of synthesis, knowledge is combined and integrated into networks to be used for future use. This information might be documented or stored in an information system.

As far as knowledge conceptualization is concerned, the knowledge transfer approach evolves in three ways. The first one is the traditional approach that assumes knowledge as distinct from practice. In this case, knowledge is taken as an object rather than a process. This object view states that knowledge is like a mental representation, which is then exhibited in terms of written words, representation, and routinized behavior (Nicolini et al. 2003). This view is interesting as it considers knowledge as a thing or object that acts like an asset with significant value for a company. Just like intellectual capital, every organization wants to enhance and grow knowledge by deeply focusing on creation, codification, and knowledge capture.

If knowledge transfer takes places at organizational levels, then the best approach is to create a network where participants could create a common or feasible means of knowledge transfer. This approach is called a "syntactic" approach. This common means could be common code, a language, a set of guidelines or procedures, or even a computer capability. For example, a standardized manual in a department could be viewed as common means of knowledge transfer and could ease the transfer of knowledge from an individual or firm. It is also useful in identifying issues that might slow down the process of information transfer. This approach is feasible if there is clarity about a problem statement and if there is an agreement within the organization on how to deal with it (Weber and Khademian 2008).

If, on the other hand, knowledge is not clear and there is no real identification system, then one could use the semantic view coined by Carlile (2002). This approach takes our problem statement from being a means for transferring information toward receipt of knowledge. This addresses the challenge that organizations might face in recognizing the role of interpretation while receiving and disseminating knowledge. A semantic approach tends to acknowledge the differences within organizations at the individual or collective level. These differences could be at different levels, i.e., mid, managerial, or executive. The nature of these differences may vary depending on experience, culture, language, and relationships among each other. It is important to position these points of differences and then organize a way out.

It is important to consider the relationship between knowledge and practice. This takes an approach called the "pragmatic view of knowledge" (Carlile 2002; Weber and Khademian 2008). According to this view, knowledge should be taken in the context of practice rather than as a means of communication. It must be situated in a setting with geographic limits, a point in time, or a particular set of relationships matters. In simpler words, this knowledge comes into being via an evolving process by the experience of those who actually create or build this knowledge through practice.

Coming toward external and internal knowledge, there are three alternatives for knowledge transfer and integration as per Grant (1996): internalization within the firm, market contracts, and relational contracts. Market contracts are considered to be inefficient means for knowledge transfer having uncertainties over valuation (Demsetz 1991). These market contracts are useful and are in fact efficient in the process of transferring knowledge when knowledge is layered within a product.

In the case of individual strategic alliances or broader networks, relational contracts are considered to be an immediate solution. If explicit knowledge could not be transferred efficiently through market contracts, then diffusion of its uncertainty over its applicability would not satisfy the internalization of this procedure within a firm. In such a scenario, networks (either individuals or firms) will be more suitable toward transfer and integration of such a form of knowledge (Grant 1996).

While discussing the role of knowledge integration within firms, it is important to notice the speed with which such capabilities can be built and then extended. There is a danger that those relational contracts are not sufficiently efficient and knowledge is not embodied within the product; those contracts might permit knowledge transfer within a relatively short time. Hence, taking competitive advantage within the dynamic market setting, it is worth noticing that critical merit of networks would lie in giving speed of access to new knowledge.

It has been established that knowledge integration is one of the most essential and yet challenging aspects within a firm or a coordinating network. In recent times, most companies have relied on technology as it could be useful to transfer knowledge among participating actors through information systems (Schau et al. 2005). It is convenient to codify, communicate, assimilate, store and retrieve knowledge in modern organizational setups. At a collaborative firm level, the main emphasis is on common interest, training, and the background that participants of a network would use to facilitate the transfer and integration of knowledge (Weber and Khademian 2008).

When actors within an ecosystem have a common focus, which is normal, they would share a common framework for understanding and utilizing the given information. However, Weber and Khademian (2008) argue that in highly diverse setting, this is not the case. Knowledge integration is not that simple as information flowing through the network may have different uses, different meaning, and even different values for groups or teams on the receiving end. This is why, it is important to distinguish between the external and internal factors of a network. There are certain aspects that are overlapping, and they may lie in both the internal and external states of an ecosystem.

Given the challenges we discussed regarding knowledge integration between firms, this plays a significant role in business ecosystems. Knowledge itself is considered as an internal asset for any organization. All of its resources are connected and communicated through a well-organized knowledge management system. Then, there is the external knowledge that comes from customers, suppliers, or even partners. It is of great value as this is the information that creates a high degree of innovation in the collaboration process. As different organizations have their own goals, they cannot share all the given knowledge. Firms, therefore, need to agree what type of knowledge can and should be shared, processed, and utilized for knowledge integration.

## 2.3 Conceptual Framework

We have discussed the significance of ecosystems and interaction of networks that may contain challenges and benefits of knowledge integration and resulting phenomena of innovation. We, therefore, propose a framework where ecosystems are composed of three components: business networks, knowledge integration, and innovation management.

Value networks simply focus on the phenomena of creating value for customers. This revolves around the context of solving customer's problems (Christensen and Rosenbloom 1995). A strategic management view suggests such networks as sources of competitive advantage for individual companies (Kapoor and Adner 2012). Standard business practices suggest that companies are rivals to each other. They compete with each other for a market share and try to gain a competitive edge over others. At the same time, it is important to realize that competition can have different meanings in the contemporary business settings. Firms tend to integrate competition and cooperation so that they could produce more diverse values for the end customer. This practice is important for competitors as they are able to rely on other firms in order to survive.

To understand the role and dimension of value networks in our framework, we should consider companies as diverse in terms of their capabilities. However, they have come closer due to business collaborations. At an individual level, a firm has to go through infrastructure development to stay competitive in the market. This phase includes key activities in finance, accounting, sales, and maintenance of relations with key partners. This process of infrastructure is both challenging and unique as there is an ample opportunity for the firm to build up links with its partners and inside its own organization. Considering this same scenario at macro level, the organizational structure phenomenon play its role in more dynamic environment. In terms of collective sense, they all act as an organizational structure. At this level, collaborative activities help organizations to create a diverse network.

Knowledge integration deals with the creation of new knowledge that could be shaped by signifying out the network nodes where this set of information is retained. The knowledge-based view focuses on generating new knowledge and technologies. One clear example of such knowledge associated networks is open source communities. As far as an organization is concerned, irrespective of its size and market shares, every individual associated with the firm has a unique set of skills. These skills are like an asset for a company and every firm wishes to translate these skills into knowledge. For high-tech personnel, these skills could be knowledge of information technology and certain tools, methods, or protocols. On the other hand, the personnel from human resource management might be experts in the team-building process. Some of these skills are not in written form, and they cannot be learnt by documented set of information. So, the problem is that one cannot codify these skills as they come along via a hard way of individual's focus, training, and experience. Hence, these skills remain an open secret in an organization. Others could learn them through a process of keen observation. For companies working in business ecosystems, each individual organization possesses a unique set of competences, and once unlocked, it can be a positive contribution to value networks.

Finally, innovation management approach emphasizes on knowledge integration (exploration) and fostering business ecosystems (exploitation) around knowledge hubs. Management of knowledge within an organization leads directly to innovation (Du Plessis 2007). Knowledge management within an organization consists of three main stages (Kogut and Zander 1996): acquiring knowledge, organizing and storing knowledge, and using and applying given set of knowledge. Tushman and Nadler (1978) define them as knowledge gathering, knowledge interpretation, and knowledge synthesis. Silicon Valley could be an example for such networks. For such systems, financial networks that tend to support main actors (companies, research centers, universities, and tech developer) are considered the key to success.

It is interesting to view the role of actors involved with each of these components within a business ecosystem. The concept of ecosystem could be view here as a whole. There is a different logic of action among all these categories. Each individual actor has a different interaction area between given component types and their relationships. Such actors are considered as dominant players (platform owners, cf. Gawer and Cusumano 2002), and they play a key role in highlighting this interaction between ecosystems. These actors do overlap and interact between business, knowledge, and innovation elements, and hence, their activities play an essential part for

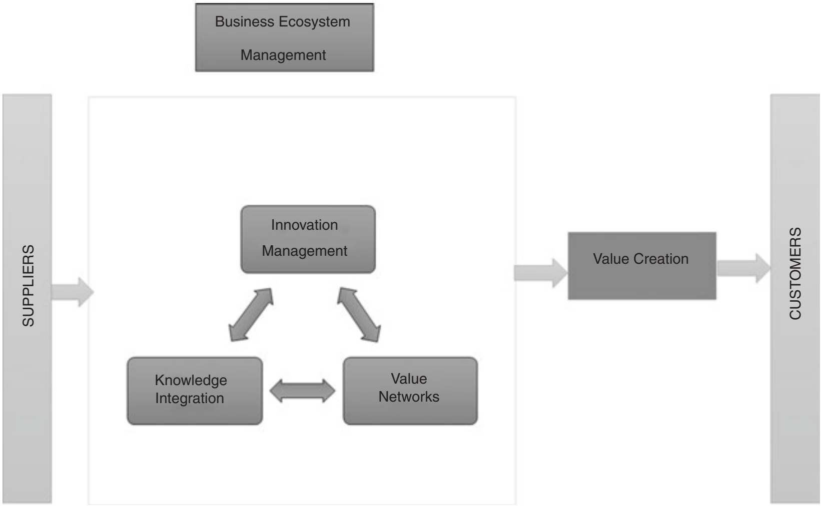


**Fig. 2.1** Proposed model

value creation. In actual fact, value creation is the outcome of these interactions among given networks in an ecosystem. Platforms, on the other hand, might be interconnecting factors among these components as well.

Platform can be an organization having complementary assets or technologies. Having these interconnecting actors and platforms, components within an ecosystem interact with each other, and hence, evolve and emerge next to each other to provide value as a whole system (Fig. 2.1).

The main benefit for collaboration of these networks and interconnections is that it is established around the process of value creation. Sometimes this value creation is linked to an immediate customer need. Consider, for example, the energy industry. There are smart grid devices through which even customers become part of value creation. They can give direct feedback to energy distributors, and hence, the whole ecosystem builds around value creation. There are some cases where this value creation does not come in use right at that time. Such value creation could be a form of innovation which may not directly be useful in one project but it could be compatible for another future project. For example, Apple's R&D teams were initially exploring tablets but ended up entering the phone market using the same multi-touch technology prior to launching tablet computing products.

Traditionally, actors within a network operate in dimensions of organization or the platform that is being used. If, however, there is a shared platform (e.g., information system) in operation, then such technological aspects and features will have a great impact on overall ecosystem and evolution of a given network (Thomas et al. 2014). Consider the examples of platform formed around dominant market players (Samsung, Apple, or even Nokia) though they are in a competitive environment.

For the knowledge integration process, the variety of complementary knowledge resources creates dependencies (Thompson 1967). This phenomenon could have both negative and positive aspects. In Sect. 2.2, we discussed how knowledge integration could be challenging in a complex network of firms competing for greater customer value. There could be positive aspects for the organization as well. The firms within this network understand the significance of other firms and their capabilities. In fact, sharing knowledge and collaborating through this phenomenon are the basis of knowledge integration process. All these organizations have their own motivation, and yet, they share certain degree of knowledge in order to strengthen this bond.

An ecosystem consists of both providers and customers, and hence, benefits are for both parties from this collaboration. In innovation management, the middle-level player or facilitators play the role of bridging actors of particular competence. This actually forms a platform within innovation ecosystems that is extremely helpful in interaction and building dependencies between organizations.

## 2.4 Concluding Remarks

To summarize, the business ecosystems can be considered as global organizations that are not limited to specific geographic boundaries. This global dimension in ecosystems is interesting as it can improve the values of a product/service for the customers. On the other hand, there are certain challenges when it comes to knowledge management. Knowledge is no more an internal asset of the organization; rather, it is an essential ingredient for networked organizational systems.

Mostly, knowledge management is viewed at the local level of ecosystem, i.e., first an organization develops knowledge integration within its units, and once benefits start showing up, they tend to share and expand that information. These meta-organizations play a vital role in developing the business ecosystem and in developing innovation among main actors of the ecosystem. It is beneficial though challenging at the same time to develop mutually organized ecosystems with a win-win attitude. Within the wave of globalization and information technology, the start-ups and SMEs (Small and Medium Enterprises) play a significant part in the modern business ecosystems. They also expect to get equal benefits as established corporates. Hence, the ideal ecosystems provide equal opportunity for all actors within the given network to excel. A network of firms where market leaders would not play a tough game as a dominant player by setting all terms of collaboration and turning competition in their favor is considered to be an ideal ecosystem.

Overall, this chapter suggests that interactions and collaboration among networks are highly beneficial for suppliers and customers. However, these aspects can also create complex situations, and hence, these ecosystems must be analyzed at multiple levels. These levels could be in the form of a hierarchy so as to understand the connection and information flow between distinct networks' components in contemporary business.

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# 3

# Team and Time Within Project-Based Organizations: Insights from Creative Industries

Francesca Vicentini and Luigi Nasta

## 3.1 Introduction

The increasing significance of "projectivization" (Lundin and Steinthórsson 2003, 236) in almost any type of business such as engineering (Shenhar and Dvir 1996), construction projects (Bresnen et al. 2004), movie productions (DeFillippi and Arthur 1998), and cardiac surgeons (Huckman and Pisano 2006) has stimulated a considerable interest in the academic debate. A line of research addresses the project management issues per se (Engwall 2003; Morris and Hough 1987; Pinto and Kharbanda 1995; Pinto and Prescott 1990), by describing projects as integrating mechanisms enabling cross-functional integration (e.g., Ancona and Caldwell 1992), as contractual arrangements

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between markets and hierarchies (e.g., Ebbers and Wijnberg 2009), and as temporary organizations with distinctive features respect to permanent organizations (Whitley 2006). According to this latter stream of research, recently, Bakker (2010) has systematically reviewed project-based organizations (henceforth, PBOS) by proposing an integrative framework which takes into consideration four main themes: time, team, task, and context. With regard to the time, prior literature has mainly investigated the effects of time limitation on behaviors, processes, and functioning (e.g., Miles 1964; Saunders and Ahuja 2006; Jones and Lichtenstein 2008) and the development of temporary organizational form over time (e.g., Lundin and Söderholm 1995; Engwall and Westling 2004). The second dimension—team—refers to organizational forms as systems that include a different set of people who work together (e.g., Goodman and Goodman 1976). Accordingly, prior contributions have focused on skills, human resources, and interdependence among team members (e.g., Terrion and Ashforth 2002; Bechky 2006; Vicentini and Boccardelli 2014). The third central dimension is represented by the task that organizational forms accomplish. Accordingly, a stream of the research has focused on the analysis of the consequences of finite tasks that organizational forms undertake. More specifically, the main issue investigated is related to the problem of knowledge transfer, which could be dispersed as the team is dissolved (e.g., Grabher 2004a, b).

The final dimension is related to the context, which refers to the linkages between the temporary organizational form and its enduring environment (e.g., Sydow and Staber 2002). By overcoming the "lonely project" perspective, this stream of the research has mainly focused on investigating temporary organizational forms as "inextricably embedded within an organizational and social context" (Bakker 2010: 479) and how the context can influence behaviors, learning, and propensity to engage in subsequent temporary ventures (Schwab and Miner 2008). However, few contributions take into consideration more than one theme in approaching to the study of these temporary organizational forms.

Moving from these considerations, this paper aims at analyzing PBOs by focusing on two of these themes—time and team—to investigate how they can affect creative contexts, where the adoption of this organization form is extreme. The project-based nature of creative productions is indeed one of the main characteristics of the creative field. Each production—such as a movie, a TV drama series episode, a book, or a piece of music—is unique, and the making of each product is a separate and time-limited project with unforeseen contingencies, for which different creative, technical, and commercial talents are assembled (Nasta et al. 2016). As a matter of fact, time plays a pivotal role in creative project-based context since it is responsible not only for the project task accomplishment but also for talent recruitment (Vicentini and Boccardelli 2014) and for the development of talents' careers (Vicentini and Boccardelli 2016).

Arguments in favor of team-based creative work commonly imply that these teams are composed of multiple members who bring different types of information, experiences, and perspectives to the table which, if properly combined, can lead to creative synergy allowing teams to develop more creative solutions than their respective members could have achieved individually (Vicentini and Boccardelli 2016; Bercovitz and Feldman 2011; Taylor and Greve 2006).

Even if the idea of diversity has a beneficial effect on teams' creativity and performance, the empirical research has not yielded equally consistent evidence for this proposed main effect (Bunderson and Sutcliffe 2002; Kochan et al. 2003; Schippers et al. 2003).

By taking together time and team as key themes to analyze PBOs, this paper attempts to shed more light on the diversity literature by focusing on the role of past work experience diversity since experience plays a pivotal role in models of work performance and behavior (Schmidt et al. 1986; Tesluk and Jacobs 1998).

The main idea is that careers in project-based industries frequently do not take place within firms; instead, individuals move among different temporary projects. Within the project-based industries, individuals (henceforth, team members) receive recognition from the market, and they build their competencies and capabilities on their previous experiences. As a matter of fact, experiences allow team members to translate the information acquired within a project into better choices and solutions for the future roles (Finkelstein and Hambrick 1996). Most previous studies, however, focused on individuals' career backgrounds tend to consider experiences as a current trait brought with them from previous experiences, without examining how different careers brought by several individuals can be combined for a better performance at a team level.

This chapter aims at overcoming this issue, by focusing on the analysis of work experience diversity in teams and providing a systematic representation of the effect on the current project performance. Specifically, we investigate the importance of work experience diversity in two project-based creative contexts: music and TV drama series productions.

## 3.2 Theory

### 3.2.1 Project-Based Organizations

The project-based organization is an organizational form in which the project is the primary unit for production arrangement, innovation, and competition while the project can be defined as "any activity with a defined set of resources, goals, and time limit" (Hobday 2000, 874).

Within projects, "individuals usually team up for a predefined time to work on the tasks set" (Tyssen et al. 2013: 53); therefore, a stream of literature has also named temporary teams to distinguish them from non-temporary teams.

The time-limited nature of the team is defined from the outset, and it is generally accompanied by nonroutine processes and uncertain working conditions (Pich et al. 2002; Whitley 2006). Projects are strongly characterized by complexity not only in terms of roles and team members' backgrounds (Bechky 2006) but also in terms of differing hierarchical roles (Skilton and Bravo 2008).

The adoption of a PBO shows some benefits in terms of processes, control and lead-time reduction (Verona and Ravasi 1999; Di Vincenzo and Mascia 2012), ability to address quickly and flexibly customer's needs (Hobday 2000), and ability to continually innovate in collaboration with suppliers and clients (Pinto and Rouhiainem 2001). In spite of such benefits, PBOs show some problems in performing routine tasks, as stated by Hobday (2000).

### 3.2.2 A New Lens to Approach the Study of Tenure and Experiences

Consistent with the study conducted by Campbell (1990), there is no "theory of experience," and what work experience is remains an open question.

Past and current life experiences are continuously affecting the development and the shape of knowledge, skills, attitudes, ambitions, beliefs, and behaviors. However, because experiences involve a continuous flow of events across different aspects of our lives, any systematic development of the construct must start with a specific area of interest (Quinones et al. 1995). For this reason, researchers who want to investigate the concept of work experience should focus on more delineated domain of life events meant as a subset of life events that are most directly and immediately relevant to work attitudes, motivation, and performance and other issues of interest to organization studies.

Within the industrial-organizational psychology literature, work experience has been used almost interchangeably with tenure and seniority (Hofmann et al. 1992). They are closely related in that each contains a time element that refers to an individual's length of service in a position or an organization. Specifically, seniority contains two dimensions: one that is based on length of time in various organizational units or roles (e.g., organization, department, and job) and a second which defines the negotiated entitlements and decisions (e.g., decisions, promotions, and recall decisions) that are determined by the length of service. The former is mainly named such as tenure, and it can be described as time spent in various organizational units or roles (e.g., managerial tenure, job tenure, and occupational tenure). Experience, likewise, contains a time-based aspect in that it connotes acquisition over time of job-related knowledge, skills, and abilities (Lance et al. 1989). In the light of this, it is not proper considering the two constructs—experiences and tenure—as synonymous, as prior literature suggested (McDaniel et al. 1988; Schmidt et al. 1986). Even if tenure and work experience share some characteristics, there are notable differences between the two concepts. One problem with the definition of tenure is that the amount of time spent in a job, in an organization or a department, does not have the same implications for all people. As a matter of fact, some people may improve their performance over time while others may get worse. Some other people may change less systematically (Hofmann et al. 1993; Hofmann et al. 1992). Therefore, solely time-based measures cannot take into consideration these interindividual differences. This is because conceptualizing work experience as tenure does not consider those important events that happen over a career such as opportunities to perform a task or duties as well the nature or quality of specific experiences (DuBois and McKee 1994; McCauley et al. 1994). Therefore, the concept of tenure seems to be too restrictive if used as the sole feature to describe the experience of an individual.

Building on this consideration, Tesluk and Jacobs (1998) propose a conceptual model to summarize the key facets of experiences, factors that influence its development, and direct and indirect outcomes. They found that experience depends on three core components. The quantitative component includes two of the three measurement modes described by Quinones et al. (1995). The first is a time-based measure of experiences, which reflects the traditional reliance on the length of time and working on a task or in a job or in an organization. The second measurement contained in the quantitative component is an amount measure. Many studies have recently supplemented tenure with measures of the number of times that a task or duty has been performed (Vance et al. 1989). The advantage of this type of measure is that it reflects important qualities that impact work experience, such as the opportunity to perform and practice.

In contrast to the quantitative aspects, the qualitative component of work experience can be described by the specific nature of work situations that contribute to the richness of the experience construct, such as the variety and breadth of tasks and responsibilities performed in a job, the types of challenges encountered in an assignment, or the complexity of a task (DuBois and McKee 1994; McCauley et al. 1994). These aspects are very context specific because certain modes are more appropriate for relating work experience to particular variables of interest.

The final component of experience in the model involves the interaction between qualitative and quantitative components. It can be described in terms of various types of acquired work experiences that depend on a particular dimension of time. One mode, density, is intended to capture the intensity of experiences; the other mode, timing, refers to when a work event occurs relative to a longer sequence of successive experiences such as those that characterize a career (Quinones et al. 1995).

### 3.2.3 The Role of Work Experiences in Project-Based Creative Contexts

Music and TV drama series productions are two creative contexts mainly organized around projects, which allow to reach temporary advantages in product markets. Music albums and TV series productions are normally realized on a project basis with a duration of several months and with highly customized and project-specific results. Additionally, each music and TV series production is based on a modular structure of occupational roles, which allows temporary teams to be assembled (Bechky 2006). Consequently, each project team can be considered as a specific type of temporary organization formed by flexible workers. Flexibility is a relevant feature for those working in the creative industries since they experiment with different patterns both in terms of situations to solve and of opportunities to face. Flexibility represents a valuable characteristic that individuals need to advance in their career in the project-based industries.

Roles are often organized hierarchically within projects, with project management roles distinguished from technical ones. For instance, the roles of producers and performers are the most relevant in music projects. Producers oversee and manage the sound recording and production of a band or performer's music, which may range from recording one song to recording a lengthy concept album. He or she may gather musical ideas for the project, collaborate with the artists to select cover tunes or original songs by the artist/group, work with artists, and help them to improve their songs, lyrics, or arrangements. Performers are those people who sing live in front of an audience and make recordings for broadcast, CD, or download. They interpret music by using their knowledge of voice production, melody, harmony, and rhythm. They may sing alone as a soloist, work with a group of musicians, or sing with others in a choir. Producers and performers are generally considered "above the line" critical roles, whereas technicians such as sound engineers, arrangers, and lyricists are considered "below the line." The final output of each music production is an album, a collection of music tracks that can be individual songs or instrumental recordings.

Likewise, in the TV drama series productions, roles are structured hierarchically within projects (Vicentini and Boccardelli 2016: 2383). Mainly, producers, directors, and actors are considered project management roles. Producers are the dealmakers who control projects. They are responsible for the hiring of directors, writers, and actors. Directors are usually the employees of producers (De Vany 2002). Finally, actors are valuable for their ability to attract financing (Vicentini and Boccardelli 2016). All of them constitute the "above the line," whereas supervisors, crafts, secondary actors, and technicians are considered "below the line."

By taking into account these considerations, we state that these industries are appropriated to analyze the work experience construct and its relevance for teams.

### 3.2.4 Old-Timers and New-Timers at Work

What makes particularly interesting these industries from a temporal lens is the distinction between old-timers and new-timers. This difference is relevant especially because teams continually cycle and recycle (Vicentini 2013; Chen 2005; Hackman 2002; Jackson et al. 1992).

Old-timers are people who have been in the industry long enough to know their jobs and to possess business and creative knowledge to develop products accepted by the market. People with a long industry history are particularly valued as they have historical knowledge. This knowledge includes personal experiences of what has worked and what has failed in the past and knowledge about who has worked on specific projects and would thus be likely to know what was needed (Perretti and Negro 2007).

New-timers are new to the industry and they do not possess sufficient knowledge to do their job. New-timers are expected to obtain the knowledge for their tasks through self-learning, which, at least initially, involved accessing the knowledge of old-timers, within the different project-based industries.

New-timers tend to enhance exploration and innovation and to improve the chances of finding new, creative solutions to tasks (Horwitz and Horwitz 2007). Old-timers, on the other hand, tend to increase exploitation, inertial behavior, and resistance to new solutions (March 1991).

Recent studies have demonstrated that team members with a similar past work experience might be able to solve issues and challenges faced during the process, especially when all individuals are experienced and they possess task-relevant knowledge acquired through prior experiences. As a matter of fact, prior experience in the industry may bring about positive effects on job performance because old-timers perfectly know the institutional norms and the cognitive mechanisms that influence the roles within the new organizational context (Dokko et al. 2009). Likewise, homogenous teams composed of old-timers may be more appealing to consumers because these individuals act as a recognition factor to the product that has been realized.

Similarly, teams composed of individuals with zero or less experience might be able to positively perform because of their ability to explore and find out new solutions to established practices. Therefore, homogeneous teams composed solely of new-timers may bring about positive effects on job performance because of their capacity to avoid status quo commitment (Miller and Shamsie 2001). Likewise, homogenous teams composed of new-timers may be more appealing to consumers because these people provide novelty through their fresh faces.

On the other hand, work experience heterogeneity creates conflicts between team members who might not be able to find the optimal balance between familiarity and novelty to approach a creative task. Likewise, the range of skills and perspectives offered by diverse past work experience may reduce the probability that a mixed team will be appealing to consumers because the market might be confused from the combination of experienced members and fresh faces working together on the project (Nasta et al. 2016).

These conclusions, presenting opposing results, provide an innovative perspective to analyze the potential combination of new-timers and old-timers, which usually has been associated with positive performance in projects.

The second element that should be considered in the project-based organization is the opportunity to perform or practice that is granted to those people working in the creative industries.

Opportunity to perform is defined as the extent to which an individual is provided with or actively obtains work experiences relevant to the tasks for which he or she was trained. Thus, the opportunity to perform focuses on a subset of all the work experiences obtained by a person after training. Opportunity to perform is not simply a function of the assignment of tasks by a supervisor to the trainee. Indeed, it also includes the active efforts of trainees to obtain work experiences relevant to the tasks for which they were trained. According to Quinones et al. (1995), amount measures of work experience refer to numerical counts such as the number of times a task was performed, the number of jobs held in an organization, and the number of organizations a person has worked for. Similarly, amount measures of work experience in the project-based industries may refer to the number of different projects accomplished since the first involvement with a project.

Flood et al. (1997) demonstrate that top management teams composed of individuals who performed in the same industry and job for a long time lose the pioneering attitude, defined as the capacity of an organization to develop new products ahead of rivals. Similarly, creative workers that spent their careers on one or few projects may perform worse than those who joined a greater number of teams. Since the project-based organizations encompass work experiences of temporary workers, prior experience accumulated in projects accomplished by these individuals may affect the variety of ideas and knowledge available when a new project team is assembled. Thus, teams composed of individuals with a greater industry-specific experience, measured by the number of projects completed, might be able to develop better ideas, products, or services compared to rivals. This means that, in absolute terms, the opportunity to perform can positively affect the project performance due to a greater attitude of team members.

However, when teams are composed of individuals with a similarly high number of projects accomplished in the industry, the positive effects of the individual diversity of experiences brought by the team members may decline, because an excess of diversity may hamper the likelihood that prior experiences in the industry provide task-relevant knowledge and skills that can be transferred to the new job. As a matter of fact, an excess of industry experimentation may cause a lack of specialization without providing any relevant knowledge and skills for the new task, which may negatively affect current project performance (Adkins 1995; Dokko et al. 2009). Likewise, teams composed of individuals with a similarly low number of projects accomplished in the industry might perform negatively as well in the current project, because of the lack of industry-specific experience needed to develop products, services, or ideas superior to rivals.

On the other hand, heterogeneous teams composed of individuals who have accomplished a different number of projects in the industry may enhance current project performance, because those members who had a greater opportunity to perform and practice in the industry can compensate the lack of knowledge about the industry experienced by those people who had accomplished just a few projects in their careers.

This is generally true in the music industry where creative workers tend to perform better together if they have substantial differences in terms of projects accomplished in the past. Combining experienced people (with a high number of projects completed) with interns (with zero or little experience in the industry) might be the right way to create high-performing teams.

On the same vein, it is important to consider the role of past work experiences accumulated by project team members in their previous career across different projects since they can contribute to gain a better result in the following project but exclusively until a certain level, beyond which too much accumulated work experience may have negative effects on the project success. This is typical of actors involved in TV drama series that need continually to address the dilemma between being typecasted or not typecasted during their career. The advantage to be typecasted is strictly related to the acquisition of a well-established reputation, but it can be seen by the market also as the inability to face new challenges.

## 3.3 Conclusions

This chapter advances the study on the project-based organizations by disentangling two of the main themes around which organizational forms can be addressed: time and team. By linking both these two elements, this chapter has generated a more fundamental framework through which project teams can be investigated, that is, based on the role of work experiences accumulated by team members within and across projects. The time-limited nature of projects implies that team members develop their career by experimenting different project-based organizations as well as projects. According to this, team members acquire work experiences that can facilitate task accomplishment in future projects and then support the idea that diversity of work experiences may better contribute to the project success.

The combined lens of time and team is pivotal to approach to the study of project-based creative contexts such as TV drama series productions and music because they can provide a further comprehension of careers dynamics. Time contributes first to analyze careers as repositories of knowledge that continually evolve over time for the "above the line" actors of TV drama series as well as for people involved in the music industry. Second, it is responsible for the task execution process which requires to respect the time-limited nature of the project itself. This is relevant for TV drama series when new projects are assembled, and directors together with production companies have to recruit new actors to realize episodes.

The team-based structure is proper for the project-based organizations but it assumes relevance in creative contexts where the uniqueness of products (piece of music or a TV drama series episode) is the main essence. As a matter of fact, teams or groups of individuals working together can contribute to generate novel ideas quickly, appropriately adapt to changing customer and market conditions, and produce multidisciplinary solutions. For instance, in the music industry, assembling teams composed of individuals with a different level of experience, diverse knowledge, and information about the industry and dissimilar competencies affects the choices regarding who has to be part of the team or not. Being a talent might be necessary to reach a high level of performance in the music industry, but working with other individuals as a team might help to get on top in the rankings.

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# 4

# Collaborative Spaces and Coworking as Hybrid Workspaces: Friends or Foes of Learning and Innovation?

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## 4.1 Introduction

The present chapter deals with Coworking spaces as hybrid organizations and their impact on innovation. Organizations have been seeking collaborative layouts for decades, and work layouts that could boost creativity and innovation are at the core of several streams of research in the Organization Design discipline. In this perspective, Coworking spaces are at the frontier of innovation. On the other hand, the Coworking spaces are conditioned by technological evolution and in particular by digital technologies, which are core in operation and innovation management research field.

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Emerging Coworking spaces add even more interest to the subject and raise interesting questions both from the theoretical and practical point of view. The Coworking spaces have continued spreading and are growing around the world at amazing prices (Deskmag 2017). They combine the need to cope with financial restraints with the opportunity of leveraging technological solutions to design workspaces that are coherent with the contemporary megatrends.

In particular, these needs are typically felt in start-ups and new ventures (Mind the Bridge 2015). In fact, the start-ups are characterized by new business, few financial assets and flexible organization, high knowledge contents, and lean business model (Osterwalder and Pigneur 2010).

Words such as flexibility, sharing economy, Open Innovation, and low cost and lean organization are widely spread in the contemporary digital economy. Mind the Bridge (2015) estimates that in 2050, more than half of the population will be a freelance worker, and for this reason, the workers of tomorrow will probably increase their need of sharing spaces in order to reduce structural fixed costs. Coworking is more than access to space and facilities. Coworking allows a sort of "working-alone-together" behavior that is attracting growing attraction (e.g., Spinuzzi 2012).

In 2005, Brad Neuberg, when he was a freelance computer engineer, founded the first US Coworking space in San Francisco, very close to the Silicon Valley area, in order to reach a greater balance and stability in his daily life as an independent worker. Today, this phenomenon has spread widely ever since in the USA and even in European countries, such as Italy. More and more freelancers and young companies are shifting toward the use of places that combine the best features of a traditional office with the benefit of working independently and flexibility at a supporting affordable cost. Moreover, these places allow someone to work in the proximity of people without forming formal ties, and yet with whom it is possible to interact, exchange ideas, and expand networks, all in a very confidential environment. These sharing environments are just known as Coworking spaces.

In this chapter, we analyze this phenomenon from a theoretical standpoint that combines organizational design with innovation management principles. In particular, this chapter is structured in order to account for opportunities and threats provided by such collaborative spaces. In fact, on the one hand, the coexistence of several innovative firms within a physical space could boost creativity and innovation; on the other hand, organizational challenges must be faced. At a macro-level, firms that are based in the Coworking space aim at firm-level innovative outcomes and performance, while they build interorganizational relationships with other firms in the same space. This raises questions about the design, the social networking, and the knowledge management approach of the organizations.

At a micro-level, individuals feel as a member of the single firm and, simultaneously, of the broader Coworking community. This paves the way for interesting debate on organizational behavior, and how workers learn within this hybrid, knowledge-intensive contexts.

From a community standpoint, positive externalities and spillovers can boost innovation. This opens up new avenues of research in the innovation management field.

Accordingly, the remainder of this chapter is structured as follows:

– Background: Organizational design, innovation, and the Coworking community
– Coworking: Types and characteristics
– Opportunities and threats provided by such collaborative spaces: Empirical evidences
– Conclusions

## 4.2 Background: Organizational Design

Knowledge-intensive firms (KIFs) require office layouts that favor the nature of the work, which is based on the centrality of knowledge assets. Thus, not only the individual worker should be provided with a physical space that is suitable to boost her mindfulness, but it is also important that workers are collocated in physical spaces where knowledge sharing is favored.

Office layouts have a long history as they trace as back as the Renaissance, when the centrality of man and his intellectual capabilities led to the initial idea of desks and studios that were able to foster the enlightenment and idea generation. Nevertheless, the concept of office spaces, as buildings dedicated to work, dates back to the nineteenth century. In the twentieth century, a clear affirmation of working districts, especially the financial districts, led to the development of skyscrapers as a block of offices developed in vertical to better exploit the physical space.

At the same time, with manufacturing growth and big factories development, working spaces layout began to differentiate between the so-called blue-collars and the white-collars. Blue-collars refer to the working class, whereas the white-collars are those workers who leverage their intellectual ability and perform tasks related to the management and control of factories. From a company layout point of view, though, both the blue-collars and the white-collars, with the exception of the managers and executives, were located in physical spaces that were consistent with the scientific management principles. Workers no matter what category had to pursue efficiency criteria. At the production level, huge assembly lines were assembled, while there were small spaces at the level of intellectual work workers. Cabins were reserved for every single employee.

Only in the second half of the twentieth century, did the development of organizational theories based on motivations and human relations lead to the development of more inclusive office layouts. This sort of revolution caused the organization of open offices, with the emergence of shared working spaces that could favor human relations and interactions among coworkers.

This revolution has never come to an end, and nowadays, it has been reinforced through technological innovations. The availability of information and communication technologies (ICTs) and the possibility that these allow for people to work remotely (smart work) have emphasized the ephemeral role of space in working contexts. Nomadism has become a keyword for intellectual workers. Indeed, the centrality of knowledge as a core strategic asset has transformed office workers into knowledge workers.

Given these assumptions, it is clear that organizational design, human resource management, and even strategic and business aspects have to consider the importance of work configuration as a contextual variable which guides the motivation, well-being, and workers' productivity. Coworking spaces resemble the serviced office industry, where customers pay a fee for access to space and amenities. However, the following three distinctive features (Waters-Lynch et al. 2016) characterize Coworking spaces as hybrid organizations:

(i) The profiles of the pioneer coworkers: The early coworkers (between 2005 and 2008) were mainly freelance creative knowledge workers who sought to overcome the social isolation that was associated with working from home or from public places, such as cafes and libraries. Thus, Coworking spaces were characterized by informality, such as informal dress code, language, and sociality, that imprinted the organizational culture of the newly born enterprises.

(ii) The centrality of social interactions: Coworking spaces are usually referred to as a *membership community* (Sundsted et al. 2009) where social interactions are fostered and emphasized, so that they can be referred to as "intermediary-configurations between firms and clusters" (Capdevila 2013, p. 11). A variety of organizational platforms (Parrino 2015) foster social interactions, including "internal digital social network sites, frequent social events, physical boards that display membership profiles, newsletters and people fulfilling a role of community hosts, curators or managers" (Waters-Lynch et al. 2016, p. 10).

(iii) The aesthetic design of the spaces that combine nonroutine, creative work and playful, open, and transparent workplaces (van Meel et al. 2010).

These characteristics render Coworking spaces as hybrid or intermediary organizational forms, in which economic actors that engage in different forms of collaboration are colocated. Inter-firm collaboration is thus intrinsic in the Coworking spaces, as colocation leads to the emergence of a highly collaborative community of freelancers, entrepreneurs, and professionals (Waters-Lynch et al. 2016). These forms of collaborations could be defined as an intermediate or hybrid organizational form (Capdevila 2015).

## 4.3 Background: Innovation and the Coworking Community

The Coworking spaces gather local communities, which are open on a global scale and perform targeted internationalization activities, characterized by a common factor, the tools and material sharing of work, hardly individually accessible (not least due to the costs) and immaterial projects, experiments, and work experiences, especially by young people at the beginning of their careers.

The Coworking spaces are a phenomenal success and are intended to revolutionize the world of work. A key element of this success is the recent emergence of Open Innovation approach, which has misinterpreted the concept of intellectual property in favor of the so-called *collective intelligence* (Lévy 1997).

The basis of sharing economy, or collaborative consumption, shifted not only in consumption practices but, above all, in work practices and sharing of this or part of it, through the sharing of environments and shared services. These "spaces" are a demonstration of how the encounter between technology and community is facilitated by the evolution of information technologies, ICTs, and finally by digital technologies.

Obviously, in this context of change and evolution, policymakers play a pivotal role (at national level and in particular at regional and local levels) through coherent urban, economic, cultural, social, and environmental policies.

Freeman et al. (1982) describe the development of technological innovations as a process which matches the technology with the market. The general picture of change and economic development plays a key role toward the process of innovation. First of all, the policymakers are contributing to the development of Coworking through coherent urban policy, economic, cultural, social, and environmental issues.

At a European level, the strategy "Europe 2020," and specifically in Italy "Industry 4.0," and recent Italian law on circular economy and the sharing economy are spurring innovative and collaborative environments. In one strategic long-term system, the vision of renewal goes through the new concept of Open Innovation supported by digital technologies.

### 4.3.1 Why Open Innovation Practices?

Phillips and Zhdanov (2013) stated that large firms usually integrate their innovative strategies to get a better performance through acquisitions. The ICT-based firms represent a good example in this sense (Arcese et al. 2016).

As theorized by Chesbrough (2013), the management of innovation is in a developmental stage and irrepressible, changing from the so-called closed innovation to the Open Innovation paradigm. Following the change in innovation processes within companies, according to Chesbrough, we are seeing a paradigm reversal in the way organizations market knowledge. Already in the second half of the '90s, several studies showed that the presence of innovative networks between firms can influence the behavior and outputs of the companies involved (Powell et al. 1996; Walker et al. 1997). In an open perspective community, all the innovation implementation passes throughout technology and knowledge transfer. These practices can be considered as a precise and particular knowledge-based transfer process on how firms and other institutions manage knowledge (Chesbrough and Crowther 2006; Arcese et al. 2015).

The most important theories connected with the concept of technology transfer identified by the literature are "the international trade theory, foreign direct investment theory, resource—based theory, knowledge-based view and organizational learning perspective" (Wahab et al. 2012). The firm increases its opportunities to absorb knowledge and therefore its possibility to develop new products and reach new markets with reduced costs and time (Mortara and Ford 2012). This concept is at the base of "cultural contamination" paradigm underpinning an open perspective in transferring knowledge is known as Open Innovation (hereafter OI) (Chesbrough 2003; Arcese et al. 2016).

In closed innovation design, research and development performed by the companies was made, in large measure, internally to corporate activities (March 1991; Wyld and Maurin 2009; Ahlstrom 2010; Lichtenthaler 2009). This concept is called closed innovation that successful innovation requires control, so the whole innovation process, from concept to distribution, must take place internally (Chesbrough

2003). Instead, Open Innovation assumes that firms can and should take advantage of both ideas that come from within and those that come from the outside; by this way, you can increase the number of possible sources of innovation.

Open Innovation has also been defined as the result of systematic research, conservation and exploitation, inside and outside the organizational boundaries, and innovative processes (Lichtenthaler 2009). Deepening the analysis on Open Innovation, Gassmann and Enkel identified three archetypes basic in Open Innovation processes, in which each of them represents a different strategy: the outside-in, the inside-out process, and that coupled (Gassmann and Enkel 2004).

The outside-in process consists in increasing the know-how of the enterprise base through the integration of suppliers, customers, and resources from external sources, increasing the innovativeness of the company.

The inside-out process allows firms to obtain profits, bringing ideas to the market, selling intellectual properties (IP), and multiplying the technology transferred to the external environment ideas.

Finally, the coupled process is placed in between the outside-in and inside-out processes and combines them working in coalition with complementary partners, in which the process of giving and receiving is of strategic importance for the success (Gassmann and Enkel 2004).

Malecki and Moriset (2009) define the Coworking space as creative cities or creative districts where the emergence of Coworking spaces is embedded in two interlinked tendencies, the growth of the "creative economy" (Florida 2002) and the digitization of the economy (Malecki and Moriset 2009), which drive the profound changes not only in the production but also in the consumption of space and places dedicated to creative work.

### 4.3.2 The Technological Evolution

Schmookler (1966) defines the "invention as an original solution results (resulting?) from sets of information obtained about a need but without commercial purposes" (Utterback 1971). Following Schumpeter's theories, innovation is generated in the occurrence of the transformation of the invention from the state of mind that of its commercial app facilitation from which to profit (Schumpeter 1961; Dewar and Dutton 1986). Finally, diffusion occurs when a certain rate of consumers, over time, recourse to innovation (Geroski 2000).

The Hype cycle of each technology is based on a different scale, based on the importance, overall, perceived by businesses and society. Gartner identifies five phases of the life cycle of a technology (Gartner Inc. 2015):

(1) Technology trigger: A potential technological innovation creates new products invented by media attention. The commercial utility is not proven.

(2) Peak of inflated expectation: Success stories often arise from advertising but are often accompanied by bankruptcies. Some react to bankruptcy, others do not.

(3) Trough of disillusionment: Interest in experiments and implementations is falling. Technology makers are not able to stay on the market, and those who survive improve their products to the satisfaction of early adolescents.

(4) Slope of enlightener: Other cases of how technology can benefit from understanding and interest in technology itself. The second- and third-generation products appear from technology vendors.

(5) Plateau of productivity: The adoption of technology consolidates. The criteria for assessing the profitability of the provider are clear, and the market relevance of the market is exhausted.

Recent studies show that the main technological characteristics that enable collaborative consumption can be summed up in five main drivers (Arcese et al. 2016):

a. Social networking, which helps to facilitate the information peer-to-peer sharing and other kinds of transactions that match supply and demand.
b. Mobile technologies, which comprise all the equipped ICT for mobile devices, such as smartphones and tablets that facilitate real-time communications among individuals.

c. GPS mapping, which allows the individuals to locate their positions, and by doing so, they can take advantage of all that is offered through localization technologies, mainly proximity services.
d. Web platform, which is the main concept behind the Web 2.0. According to O'Reilly (2005), Web 2.0 is the network as platform, spanning all connected devices; its applications make the most of the essential advantages of the platforms: delivering software as a continually updated service that gets better the more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an *architecture of participation* and going beyond the page metaphor of Web 1.0 to deliver rich user experiences.
e. Payment systems, which are steady to smart e-commerce and invoicing systems to make payment transactions easier.

The Open Innovation paradigm and the new digital technologies are on the basis of the Coworking activities.

## 4.4 Coworking: Types and Characteristics

Like other countries, Italy now counts a substantial number of Coworking spaces, such as "Toolbox" in Turin, the numerous "Talent Garden" (more than 25 across Italy and rest of the Europe, but especially in Rome and Milan), public Coworking spaces offered by the public administrations to the smart workers, and Coworking as laboratories or smart factories.

Over time, the types of Coworking have increased along with their number, differentiating on the basis of the services offered and the types of membership. In particular, vertical Coworking spaces are targeted to individuals belonging to the same industry. Instead, horizontal Coworking spaces host members that belong to different fields and disciplines. There are then niche Coworking spaces that provide services needed to a specific segment of the population, such as Coworking for photographers who have the equipment and the room posed in place or

Coworking that offer nursery for parents who can thus take advantage of a unique place to work with children and taking advantage of the babysitting service.

Coworking spaces can be also differentiated by their location, ranging from spaces that are very centrally located to spaces that are in the periphery. The first type is almost always small in rented premises and therefore sacrifices some of the services and facilities offered, sometimes lacking the meeting room. However, this is surpassed by the numerous and countless services in an area like the city center and also enjoys an optimal location for those who travel by public transport as it is certainly well connected. Suburban Coworking, on the other hand, generally has very large spaces, allowing it to offer more varied services and ad hoc environments for any occasion, sometimes also having large open spaces for gardens and picnic areas. However, these Coworking spaces are easily accessible by car and often also have large parking areas. Most of the Coworking is born in abandoned industrial buildings, in a sense of re-qualification of abandoned industrial spaces.

It is, therefore, possible to classify the Coworking spaces as follows:

- the specialized production Coworking, which is dedicated to companies that carry out specific activities, or Coworking spaces that pool a social need (dedicated to mothers and working women, or other specific social needs);
- the factory-lab, i.e., communities that aggregate operations and typical practices of production processes, or especially in German, there are hackerspaces in which computer hackers develop group projects; and
- the New Yorkers Coworking, which is characterized by sharing work equipment (crafts) in common areas.

The Coworking allows collaborative activities that favor, or even create, the emergence of new professions, and seems to be able to represent a response to the need to bring back inside the town centers, deprived of their traditional activities, a new productive vitality, resulting in the upgrading and conversion of real estate spaces and the functional regeneration of urban reality, especially those of smaller size.

Coworking thought in the latter optical can contribute to social welfare as this is proposed as a place that represents a logistic solution, and stimulates the development of complex social phenomena. In addition, the social function is performed by respecting the characteristics of the business fabric of the area and helps the development of sustainable activities that can contribute to the development of a smart city model.

The central role of higher education institutions makes it a reference point for the area pushing the property to be a stimulus for learning opportunities and social relationships that stimulate creativity and innovation.

## 4.5 Opportunities and Threats Provided by Coworking Spaces: Selected Case Studies

In the paragraphs below, we offer some significant examples of the Coworking experiences. Though our sample is not statistically significant, we selected Italian case studies that allow for some fruitful discussion about the organizational hybrids provided by Coworking spaces, as well as their impact in terms of learning and innovation. The first case study tells the story of a broad international Coworking space called Talent Garden (TAG). It represents an international benchmark of Coworking mainly for start-ups in the digital industries. The second case study is more peculiar, as it represents a specialized Coworking in the creative and artistic sector. Then, we focus on the vertical Coworking model, with a focus on two examples of Coworking spaces targeted at parents with children, who strive to find their own work–life balance.

### 4.5.1 Talent Garden

TAG is a global network of digital innovators, a physical Coworking space for digital ecosystems to meet, work, learn, and collaborate (Talent Garden 2017). It offers a variety of facilities well beyond Coworking spaces, such as training courses and events across Europe. The Coworking spaces are designed to enable the community to work, collaborate, connect, and reach their goals. Campuses are open 24/7 and offer workstations, meeting rooms, training classrooms, and relaxation areas. TAG is the largest physical platform in Europe for digital talent. In fact, TAG heavily focuses on talent, and it offers a journey toward growth and success. They claim that they offer Passion Coworking Spaces, thus highlighting the community dimension, and they stress out the importance of the ecosystem for the growth of the digital start-ups.

Among the campuses spread throughout Europe, Talent Garden Rome, located in an old Post premise, has been conceived as a unique innovation ecosystem where start-up and digital talent can find the tools they need to turn their ideas into reality and grow their business by joining a network. Present in five nations and affirmed as the largest aggregator and natural accelerator of European talent. Not just a place but a platform where there will be more than 100 digital innovators, TAG Innovation School, the school that will train professionals in the new digital and innovation professions, and more than 100 events that will be organized during the year to connect innovators with businesses and the realities of the territory. Within the Coworking space, the business incubation of Digital Magics is offered, which provides the training programs organized by TAG Innovation School and many events dedicated to innovation.

### 4.5.2 Coworking Space for Creative Industries and Artists: Gottifredo—Media Art (Made with the contribution of "Fondazione Terzo Pilastro—Italia e Mediterraneo")

The tag line for Coworking Gottifredo is "Art and the city … You'll never work alone!" This Coworking space is located in a historical small town in the Lazio Region, Italy. The original idea at the basis is Digital Business for artists and cultural contamination in sharing spaces for the city's involvement and economic growth.

It creates a Coworking space that will be located in a historical building, spawning an unprecedented agent of change in the city, both for training activities and job prospects, and also for attracting young minds that will raise the human capital of the city and will expand the network of its human and social capital.

New media/art relates to artistic activities and works created with new multimedia technologies, including digital art, computer graphics, computer animation, virtual art, internet art, interactive art, video games, computer robotics, 3D printing, and so on. The differences between media/art and cultural object or simply social events are in contrast to those deriving from old visual arts, such as traditional painting or sculpture.

This concept is at the bases of contemporary art. In fact, many art schools and major universities now offer majors in "New Genres" or "New Media," and a growing number of graduate programs have emerged internationally. This type of art is often characterized by involvement and interaction between artist and audience or between observers and artwork that responds to them. In addition, social exchange or forms of interaction, participation, and transformation serve as a common ground parallel to other phases of contemporary art practice. Concerns arising from the use of new media in the art are often derived from telecommunications, mass media, and digital electronic delivery modes, with practices ranging from conceptual art to virtual art, and from performance to installation.

Media/art Gottifredo Coworking stems from a cultural, economic, and technological context, in a small city full of young people and with a strong tradition of culture and art. The media/art Gottifredo Coworking will promote high-level training (by involving successful specialists) and professional networks, and it will be a national point of reference for the integration of art and Digital Business.

Media/art Gottifredo Coworking opens up new paths of research in the field of innovation management. All the services are aimed at supporting the entrepreneurial activity of young artists: fast broadband, art laboratories (painting, decoration, scenic design, interior design, eco-design, etc.), exhibition spaces, multimedia newsrooms, training and e-learning classrooms, a shared multilingual administrative office, and a crowdfunding platform for the young artists' creations promotion that will connect them to experts, art galleries, art curators, and the art market in general.

The Coworking activities aim at encouraging the advancement of complex social phenomena that developed spontaneously in other cities. There are, in fact, other instances to take as an example, such as Florence, Lucca, and Berlin. Common work spaces are growing all around the world at surprising rates (4th Global Coworking Survey 2015, Deskmag). They combine the need to save money with the chance to use technological solutions in order to create work spaces that are coherent with the contemporary megatrends. The positive repercussions of this project can spur the innovation and the internationalization of the city.

In addition to preserving the features of the historical city center, this new facility will be an incentive for learning opportunities and social relationships, through a hybrid organizational layout occupied by art professionals. This organizational layout and the community created in the shared space will stir creativity, assisted by the digital support. The particular objective of the Gottifredo project concept is the contribution to training activities and professional assistance, achievable through actions aimed at filling the lack of technological development and through the creation of a network of knowledge and expertise that will support the occupational development of the professional categories that are involved.

Coworking Gottifredo also has a macroeconomic ambition, which consists in creating a landmark that will favor social development by using the widespread network of the external forces (commercial networks, partner institutions, services for professionals, artists, and citizens) in order to add and share value to all the activities performed externally. These actions will improve the rates of local employment both in the support provided to the arts institutes, academy, and local universities, and in terms of job training and job placement.

The Coworking space was originally created to operate in a small town, of about 30.000 inhabitants, and to gather the potential body of users living in the whole city and neighboring provinces. The media/art Coworking is an idea that can be replicated on a national and international scale, by the creation of a specific network. In the future, it could become a model of how to transfer knowledge between the art world and the job market, and it could create new professional figures and self-entrepreneur artists.

For the first year of its activities, the media/art Coworking Gottifredo space offers for free to all the young artists that will apply for it and for the entire number of the workstations, upon a prior interview and an examination of the candidate's motivation. The process will favor the candidates enrolled at the partner institutes of the initiative. In the time span that follows, the media/art Coworking will annually open the selections to more young people and offer them professional opportunities and the chance to distinguish their artistic activities, their products, and their works.

In terms of critical points or disadvantages, it is possible to find cost/revenue ratio as the first. Compared to the generic Coworking spaces, a media/art spaces need to support higher starting costs: historical buildings for locations, locating and maintaining the facility, providing furniture, and artistic and digital equipment: software, 3D printers, equipment for exhibitions, and the cost of the staff. In addition, initial revenue does not cover fixed costs for space managers because coworkers must have the option of low-cost initial access. The revenues could stem from participation fees, shares on the activities, formative activities open to groups of people, rents for exhibitions, seminars, and workshops. Fundraising is necessary for the start-up time and it was contextually activated: The media/art Coworking will look for private sponsors for the realization of specific projects and will apply to competitions for funds, and an activity of crowdfunding will be activated in collaboration with specialized institutes, prize, and partnerships.

### 4.5.3 Coworking Spaces for Work–Life Balance: The Hive and I Love Mum

For some companies or professionals of a different nature, sharing workplaces and pooling resources, skills, and knowledge is an innovative, stimulating, and intelligent choice. For others, such as parents with small children and toddlers, it can be an opportunity to realize their own talent and personality. This is the motivation that led a not-for-profit volunteer association to launch a Coworking project called L'Alveare (The Hive) in 2009. Located in a disadvantaged district in

Rome, the Hive provides a Coworking space with baby space. It is the first example of urban welfare integrating Coworking into an innovative educational service (L'Alveare 2017).

In an area of more than 200 square meters, there is a baby area of 50 square meters suitable to accommodate twelve children and equipped with autonomous services. The work area has 20 workstations, two offices, a meeting room, a nursing space, services, garden, and outdoor space. The Coworking rates are affordable: around €3 per hour for the base rate, while facilities are provided for those who enjoy more than one service simultaneously and for a long time.

Other facilities are provided. All the companies are given the opportunity to contract with a teleworking facility and maternity leave period for employees (an ideal solution for all nursing businesses). There is standard office equipment (PCs, printers, projectors, programs, etc.) in the Hive, as well as support for home-based services such as home-based shopping, buying groups, and hand-crafting. One of the objectives of the project is also to facilitate and stimulate the creation of a community that shares working methods, projects, services, and activities through the creation of a network of good cooperation practices between the various professionals sharing space.

The Hive can be identified as a concrete best practice in the region. Through the sharing of space, it is possible to activate that network of ideas, projects, and activities that today can make a real contribution to the economic, social, and urban upgrading of our suburbs.

The *I love Mum* case is more recent, as the idea of this program originated in May 2014 by a team of women who aimed at creating a project of social, contemporary, and quality innovation. I Love Mum is the affordable and alternative solution for parents, freelance, and professionals who have small children to care for (I Love Mum 2017). It is located in Trastevere and, like the Hive, it offers a shared open space office where comfortable and equipped places can be rented. It is equipped with 10 workstations with Internet connections and the chance to use shared tools and services such as printers, computers, scanners, and a meeting/event room.

This new venue provides an opportunity to work in close collaboration with other professionals, a stimulus to compare, collaborate, and blend new ideas and projects. I Love Mum is Coworking with added value: the baby care area. This is a child-sized space adjacent to the office where professional babysitters care for children aged 3 months and above. Among the services and opportunities offered by I Love Mum in Trastevere, it is important to cite the opportunity to participate and organize events, workshops, and courses of various nature for adults and children, and the opportunity to propose and share projects counting on the support of the professionalism made available from I Love Mum, facilitating in creating professional and human networking. The enrollment also entitles you to participate in all the free activities of the association and to facilitate participation in paid courses and events for adults and children. Subscription formulas start from €200 per month for Coworking and €150 per month for baby care.

## 4.6 Conclusions

Coworking has risen as a promising new model of work that appears to be effective in the context of the collaborative and sharing economy (Gandini 2015; Botsman and Rogers 2011). It represents a collaborative model of work and an example of distributed work and flexible organization (Spinuzzi 2012). Coworking spaces seem to function as *relational milieus* that provide workers with an intermediate territory to "enact distributed organizational practices" made of continuously negotiated relationships in a context where professional social interaction is simultaneously physical and digital. This interaction leads to an innovative outcome, both in terms of business development and in terms of organizational innovations that are instrumental to business growth.

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5

# Investigating the Impact of Agile Methods on Learning and Innovation

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## 5.1 Introduction

The publication in 2001 of the Agile manifesto (http://agilemanifesto.org/) led to unprecedented changes in software engineering. It introduced a collaborative software development approach leveraging on the knowledge and experience of motivated teams and empowered people that self-organize to deliver working software at short and regular intervals. With a dominant

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"lean" mentality to reduce unnecessary work, such as the creation of wasteful documentation, and the tendency to accept the uncertainty and volatility of requirements, developers are collocated to work at a sustainable pace and guided by an active customer (or its representative) who completely shapes the evolution of the software (Dingsøyr et al. 2012).

Since the Agile manifesto was published, the adoption of Agile methodologies has become quite widespread. The 2010 Forrester report (Hammond 2010: p. 2) states that "Agile development is rapidly becoming the norm" since 35% of surveyed organizations described Agile as their primary development method and another 16% use iterative development. Scrum working is the most diffused Agile methodology.

However, despite its wide adoption and the benefits claimed by many scholars, few studies investigate the effects of using Agile methods, and there is a lack of knowledge on issues related to Agile as an established way of working over a long period (Abrahamsson et al. 2009). A notable exception is Dybå et al. (2008), who investigate adoption, adaptation, and comparison of specific measures such as productivity and quality software development between traditional and Agile methods. However, the effectiveness of Agile such as its impact on specific organizational outcomes (e.g., quality and productivity) has not been dealt with explicitly in the literature (Senapathi et al. 2012). One of the reasons for this is that comparable data before and after the adoption of Agile which would allow investigation of its impact are scarce (Schwaber et al. 2007).

There is a dearth of in-depth studies on the effects of using Agile methods in product development. This lack of research becomes even more critical when we try to investigate its effects in application contexts where Agile approaches were not originally intended, e.g., in settings outside software development. We also need to look beyond the direct short-term effects on productivity, efficiency, and quality, and to investigate the strategic and long-term effects on, e.g., learning and innovation. Agile development theory does not focus on how the use of Agile can affect learning behavior in Agile teams to influence their innovation capabilities. Although innovation is often the main motivation for using Agile approaches, rigorous research evaluating innovation on post Agile adoption is lacking (Abrahamsson et al. 2009). However, the literature on Agile is very positive about the benefits of Agile on innovation, see, e.g., Highsmith (2004, p. 21), who states that "creativity and innovation are the emergent results of well-functioning Agile teams" since Agile "incorporates the chaordic perspective that creativity and innovation occur in a slightly messy environment" (Highsmith 2002, p. 5). Highsmith's sentiments are echoed by Chin (2004), who confirms that innovation is an important characteristic of Agile but requires skills to effectively manage the tensions between process and innovation needs.

Apart from the lack of empirical research, there are some basic reasons for skepticism. Agile's tendency to promote shorter and iterative deliveries, the creation of Agile teams, the lean mentality to reduce waste, and the constant change in customer requirement brought by high customer involvement could also be problematic from an innovation perspective. These factors can hamper more radical innovativeness or innovation as indicated for speed to market (Fang 2008), high customer orientation (Cheng et al. 2010), and dense networks in teams (Burt 2004). These apparent trade-offs have a theoretical origin in the topic of organizational ambidexterity and the inherent trade-off between exploration and exploitation (March 1991). This literature underlines that a method or way of organizing can bring greater efficiency but can have an adverse effect on innovation. In the case of Agile, efficiency as an outcome is likely to be more plausible than innovation. Furthermore, it is likely that innovation is facilitated by organizational learning and interaction.

In this paper, the results of an exploratory survey among team members in a multinational corporation (MNC) in the telecommunication industry are presented. The aim of the survey is to identify a few variables within a larger number that may be relevant to explain the difference between the organizational process and product innovation performances across the Agile transformation.

The main objectives of the present study are to study the impacts of Agile methods on innovation by examining their effects on teams' innovation performance and team learning. This chapter is structured as follows. The theory section provides background information on Agile and presents an overview of the research on ambidexterity studies indicating possible trade-offs from the use of Agile. Organizational learning is presented as a potential vehicle that may result in an inverse relationship between Agile and innovation. We next describe the research setting and methods used. We, then, present, analyze, and discuss the results. The final section provides the theoretical and practical implications of the study.

## 5.2 Theoretical Framework

According to Highsmith (2002), Agile methodologies consist of a number of practices. The most prominent of these is lean development (LD), adaptive software development (ASD), scrum, extreme programming (XP), crystal methods, feature-driven development (FDD), and dynamic systems development method (DSDM). With the exception of LD, the originators of these methods were coauthors of the Agile manifesto which is based on a common vision of key business values; documentation of overall project scope, objectives, constraints, clients, and risks at the time of project initiation; short, iterative, feature-driven, time-boxed development cycles in definitive, customer-relevant parts; constant feedback to stay on track; customer involvement focusing on business value; and technical excellence. Underlying Agile practices and central to Agile methodology are self-organizing teams with collocated members (Dingsøyr et al. 2012). Conflicting demands between alignment and adaptability involve self-organizing teams contributing to develop an internal contextual ambidexterity, i.e., the ability to pursue these objectives simultaneously (Ramesh et al. 2012).

### 5.2.1 Ambidexterity and Potential Trade-Offs in Agile

Inherent to the Agile principles outlined above are the core arguments of why more radical innovation can be difficult. In a seminal paper, March (1991) clarifies the problems involved in accomplishing this paradoxical combination by distinguishing between exploration and exploitation, aimed, respectively, at addressing search, experimentation, flexibility, discovery, and innovation refinement, efficiency, implementation, and execution. Following this line of research, Tushman and O'Reilly (1996) described organizations able to perform different and competing strategic activities simultaneously as ambidextrous. Three main approaches are proposed in the literature on organizational ambidexterity: structural (O'Reilly and Tushman 2004), contextual (Gibson and Birkinshaw 2004; McCarthy and Gordon 2011), and leadership based (Smith and Tushman 2005). The first type proposes a separation in the organization between exploration and exploitation activities and the simultaneous implementation of an integration layer. The second is achieved through a set of processes or systems allowing people to make an own judgment. The third considers the roles of top management in solving the tensions between exploitation and exploration. However, regardless of the type of approach adopted to achieve ambidexterity, the way the organization facilitates learning and knowledge transfer is particularly relevant to simultaneously achievement of exploitation and exploration (Kogut and Zander 1992; Teece and Pisano 1994).

Organizational ambidexterity has attracted increasing research interest but less research has been done on how organizations achieve it (Adler et al. 1999; Siggelkow and Levinthal 2003). It remains unclear how firms can conduct both exploration and exploitation. From the analysis by Cantarello et al. (2012), it seems that (1) only a small number of studies on ambidexterity use multiple sources of data, and (2) the majority of papers use a survey strategy with the firm as the unit of analysis and link ambidextrous status to organizational performance. There are very few qualitative studies that focus on organizational mechanisms (e.g., Andriopoulos and Lewis 2009, 2010), which are on the basis of ambidexterity. Also, to the best of our knowledge, there are no empirical studies showing how knowledge management practices can help to build the dynamic capabilities needed to combine exploration and exploitation. Specifically, in a context of high levels of process management such as created by the implementation of Agile/scrum methodology, there are conflicting demands between operational and innovation excellence, e.g., Chen et al. (2009). This study adds relevant contextual factors to improve the understanding of whether Agile is more or less suitable for different environments and strategies.

Introducing teams (Agile teams) as a more fine-grained unit of analysis opens up new ways to approach ambidexterity in the organization as well as a new tension to solve, in the light of the ones already introduced by Raisch et al. (2009). Another possible trade-off in Agile is highlighted in the literature on innovation which differentiates between product and process innovation (e.g., Utterback and Abernathy 1975). During the product life cycle, product innovation normally precedes process innovation (Utterback and Abernathy 1975; Klepper 1996). However, some management studies report that the combination of different innovative activities aimed at both improving existing products and decreasing the costs of production is an important source of competitive advantage (Kim and Mauborgne 1997). This is in line with studies that link the organization's ability to compete in the market with its ability to be more efficient but also with its capability to be efficient and innovative simultaneously (e.g., He et al. 2004). Some studies suggest a trade-off between process and product innovation. For instance, Callois's (2008) study following Burt (2004) indicates that local proximity favors process rather than product innovation because the more tightly coupled the team members, i.e., dense network typical of Agile teams, the more likely they will share knowledge and understanding of underlying work processes. This, in turn, creates more knowledge exchange and learning about the process. Innovation stems from more loosely coupled teams whose members bring diverse and novel ideas from the surrounding environment, which results in innovation. This line of argument is developed further in research on incremental and radical innovation, e.g., by Hemphälä and Magnusson (2012). It is suggested that creating more tightly connected Agile teams may hinder innovation—especially the more radical type.

In a study of how customer orientation effects firms' service innovation, Cheng and Krumwiede (2010) find that a strong customer orientation does not facilitate radical innovation. This finding is derived theoretically from the argument that overreliance on customer feedback has a negative impact on innovation (Christensen et al. 2005; Christensen 1997). This is because customers place stringent limits on the strategies firms can and cannot pursue (Christensen 1997). In Agile, there may be overreliance on customer feedback which has a negative impact on innovation. On the other hand, the "trial and error" approach emphasizes the value of action that generates information which is a source of innovation and renewal for self-organizing teams (Nonaka 1988). Moreover, cross-functional teams, as the Agile team is, realize a condition of "information redundancy" which increases the possibility to develop trust and loyalty to generate problems and solutions (Nonaka 1989). This effect can be maximized by the achievement of higher information creativity through a form of "compressive management" (Nonaka 1988), which means top management generates a vision that determines the direction of the whole organization while middle management promotes the process of information creation within teams, engaging relevant members in these teams and acting as "translators," enabling individual visions to contribute to the larger vision. This influences the information and the knowledge-creating characteristics of self-organizing teams.

### 5.2.2 Organizational Learning and Routines

Abrahamsson et al. (2009) suggest that evidence of the relationship between Agile and innovation is missing. There is no robust empirical evidence on the specific effects of Agile methods and practices on innovation that considers learning as mediating this relationship. However, some studies indicate that learning enables innovation in Agile teams (Nerur and Balijepally 2007).

Organizational learning has been defined as "a process in which organization's members actively use data to guide behavior in such a way to promote the ongoing adaptation of the organization" (Edmondson and Moingeon 1998: p. 28). It is evident that the instilled beliefs can drastically shape team behaviors and the capability to learn. Current knowledge and belief systems can be considered part of the interpretation process according to Shaw and Perkins (1992). This is in line with the concept of absorptive capacity (Cohen and Lenvithal 1990, p. 128), which underlines the notion of learning claiming that "prior related knowledge confers the ability to recognize the value of new information, assimilate it, and apply it to commercial ends." So, prior related knowledge facilitates learning of new related knowledge. Knowledge is a set of learning skills that determine the organizational goals for groups in the organization since "the greater the organization's expertise and associated absorptive capacity, the more sensitive it is likely to be to emerging technological opportunities and the more likely its aspiration level will be defined in terms of the opportunities present in the technical environment rather than strictly in terms of performance measures" (Cohen and Lenvithal 1990, p. 37). Consequently, prior learning experience can affect subsequent learning tasks (Ellis 1965). In the case of self-managing teams, there is a further form of control within the team which is a consequence of the existing management belief system: concertive control (Barker 1993), which consists of value-based normative rules that constrain organization members.

Among organizational learning intervention studies, the contributions of Senge and Argyris are especially relevant. Senge's (1990) proposal relies on the concept that organization members must be engaged in a process of learning to understand their own system avoiding the use of expert consultants. The experience of accountability of results is central to this intervention. The objective is to allow organization members to discover how the results of their own thinking are responsible for the problems they deal with. Argyris (1982) refers to learning as "detection and correction of error" and reports how difficult it is for individuals to detect their own errors in complex interpersonal communications.

Many people operate a dysfunctional theory-in-use which Argyris and Schon (1974) refer to as "Model I" in which reduced sensitivity to feedback inhibits the detection of errors, avoiding learning about the real cause of the problem. In order to recover from this, Argyris (1982) argues that people need to adopt Model II. Model II theory-in-use leverages on directly observable data and active support relying on illustration, testing, and others' views.

Although these theories and their rationales differ, both researchers show that cognition of people can lead to accidental counterproductive effects since erroneous causal models or theories of use contain characteristics that can block people's awareness of their problematic nature. Senge proposes the usage of a researcher to facilitate the diagnosis about not-obvious causal relationships in the system while Argyris believes that people may learn Model II with the help of external interventionists. Agile research argues that double-loop learning (Model II) is more characteristic of Agile methodologies than single-loop learning (Model I) dominant in traditional work (McAvoy and Butler 2007; Nerur and Balijepally 2007). However, Nerur and Balijepally (2007) claim that learning is incremental and emerges during the implementation of Agile methods. Underlying the more incremental, time-stressed situation in Agile teams is also a typical comment by Agile team members in Laanti et al.'s (2011) study, maintaining that products are created as fast as possible without any planning or design, and that major decisions are made "off the cuff" in hallways. This suggests the need for some clarification of apparently contradictory statements about the nature of learning in Agile teams.

Slater and Narver (1995) point out that organizational learning is recognized as a critical organizational behavior for achieving competitive advantage, and in this sense, the effects of Agile are of fundamental importance. Considering that Agile organizations primarily realize organizational learning through learning in teams (Flumerfelt et al. 2012), team learning is a basic mechanism to secure Agile teams' knowledge and skills which provide the capability to develop new products and services and to improve existing ones to meet the demand (Kidd 2000). Principles of self-organization and self-transcendence transform team learning into a self-regulatory process that is fundamental for understanding the peculiar learning dynamics of Agile teams. Self-regulation consists of a sequence of volitional episodes (Kuhl et al. 1994) which together become a recursive flow of information: Engagement in academic tasks is determined by (domain, strategy, and task) knowledge and beliefs (including self-motivational ones) that contribute to building an interpretation of the task's properties, which enable goal setting. The goals are achieved by applying tactics and strategies that result in mental and behavioral results; process engagement monitoring and product monitoring generate internal feedback; and the information derived becomes the input to further interpretation of task characteristics. External feedback provides information that may confirm or refute the interpretation of the task and the adopted approach to learning.

As already mentioned, the link between team learning and Agile methods has not been explored in detail. A fruitful way of investigating this link might be the concept of routines which have to be considered in the context of self-regulatory processes. Many scholars have focused on the role of routines in organizational and team learning. For instance, Levitt and March (1988) note that organizations frequently stop looking for alternatives once they have built experience in known routines. This generates conditions that inhibit organizational adaptability, referred to as "superstitious learning" (viewing desired results as the outcome of well-reasoned actions), and competence traps (believing current practices to be better than potential new ones). Routines give the stability necessary for learning by providing a basis for predictability and comparison (Tyre and Orlikowsky 1996). The nature of organizations' routines shapes organizational performance and results (Nelson and Winter 1982). Routines are established and justified by the decisions and actions of individuals. These decisions depend on and are derived from organizational control mechanisms, and individual behaviors are determined by individuals' interpretations of their environment. In line with this focus on individuals' interpretations, research suggests that routines and performance effects are mediated by relational coordination. In a study of hospitals, Gittel (2002) provides empirical evidence that routines work by enhancing the interaction between organizational members, which in turn has a positive impact on the performance. Arguably, Agile methods can favor a certain set of routines that shape team learning—specifically those routines that are in line with Agile principles that focus on short-term delivery, effective utilization of resources, and frequent customer feedback and change, all of which are operationalized through collocated team work. The relevance of learning and innovation to maintain the organizational competitive advantage, the inherent trade-offs between innovation and Agile principles, and the anticipated effect of routines on learning performance justify the following research question.

*RQ: How does use of Agile methods impact on product- and process-related innovation and learning in teams?*

## 5.3 Methods

This section describes the cases, data collection methods, and modes of data analysis, and discusses the model used for the investigation and the main measures.

### 5.3.1 Research Setting

We study the emergence of learning and innovation in Agile teams using the multiple case design. This allows application of a replication logic since the multiple cases are handled as a series of experiments, where each successive case is aimed at confirming or refuting the inferences from the previous one(s). Our study includes three research and development (R&D) organizations (A, B, and C) in the same international company in the telecommunications industry. Organization B is under formal control of Organization A, as a low-cost partner. Each firm was once functionally organized and adopted full Agile scrum methodology at the end of May 2011 having started with a large-scale effort to form at the end of 2010. The study was conducted at the end of 2012, 18 months after the transition to Agile.

### 5.3.2 Data Collection and Analysis

Data collection was conducted in six steps. First, in a preliminary qualitative research phase, a three day visit to two (A and C) of the three R&D organizations was undertaken to gather preliminary information on the connection between the use of Agile and its effect on learning and innovation. Two workshops were organized. One was to discuss innovation and learning in Agile teams, and the other was aimed at achieving an in-depth understanding of the reasons why people in teams felt stressed. Following this, we conducted interviews with local management and held a group interview with local innovation coaches in order to gain insights into the perceived difficulties of innovating in Agile teams. Second, in a subsequent research phase, a web exploratory survey was designed and administered to all members of the 51 Agile

**Table 5.1** Survey response rates with a number of target respondents for each organization

| Organization | Number of employees | Number of Agile teams | Number of respondents | Response rate (%) |
|---|---|---|---|---|
| A | 120 | Seven teams; eight people within each team | 56 | 70 |
| B | 350 | Forty-one teams; eight people within each team | 315 | 46 |
| C | 83 | Three teams; eight people within each team | 35 | 34 |

teams in the sample (a total of 406 respondents) (Table 5.1). The survey comprised 73 questions with Likert-scale answers (5 alternatives from strongly disagree to strongly agree) and five open-ended questions. Teams were invited to respond via mail to the survey within a month from its administration. The heads of the three organizations were kept informed about current participation rates throughout the four week period so that they could encourage participation if necessary.

Third, in a semi-structured group interview phase, 17 group interviews had taken place between groups of line managers, team members, scrum masters, Agile product owners, and systems managers in each organization. They were interviewed not only in order to validate the information collected from the survey but also to get a better understanding of Agile teams' learning and innovation. Each group included two or more representatives from the same organization. The interview instrument included questions to elicit information on (1) current organizational knowledge transfer activities, (2) Agile teams' perceived barriers to innovation and learning, (3) problem-solving techniques used by Agile teams, and (4) organizational routines enabling reflection on products and current technologies. Fourth, in an organizational documentation collection phase, substantial efforts were made to collect additional information from available organizational documents to understand and confirm: (1) current organizational knowledge management practices, (2) how project portfolio planning was organized, (3) organizations' innovation processes, and (4) the organizational design in place to achieve operational goals and drive innovation and learning.

Throughout the assessment period, we had continuous phone and e-mail exchanges with the appointed reference people for the three organizations which allowed for continuous clarification and validation of our understanding. Many of the interviews were recorded, and we reviewed the tapes and interview notes to identify data providing evidence of learning/innovation mechanisms in Agile teams.

### 5.3.3 Investigation Model

To evaluate the impact of Agile methods on the product- and process-related innovation and learning, and develop the scale for measuring innovation and learning within Agile teams, we drew primarily on relevant literature and on interview data from members of self-managing teams. We began by determining a theoretical basis for scale items from Nonaka's (1988, 1994) original works and the ethnographic descriptions of working in teams derived from our initial observations along the organizational workshops and three day visit. In particular, after the organizational workshops, we next conducted two focus groups of team members who were asked to respond to open-ended questions on the rules, systems, and behaviors they had instituted in their teams. Every identified scale was duplicated for product and process in order to let the data clearly reveal the difference in behaviors noticed during the interviews and the observations. We next aggregated the responses from the team groups and abstracted a set of potential items, which we compared to our literature-based set and deleted redundancies. The stepwise ordinary least squares (OLS) regressions, consisting of correlation, partial correlation, and multiple regression, were attempted. The following variables emerged relevant in the explanation of the effects of Agile on organizational innovation performances: (1) flow of product and process ideas into teams, (2) opportunities for teams to discuss product and process ideas, (3) team experience with Agile methods, and (4) learning and team information exchanges of new process and product ideas (Table 5.2).

**Table 5.2** Variables for stepwise OLS regressions

| Variable name | Description | Measure |
|---|---|---|
| Product innovation | Innovation about products | Many relevant new product ideas circulate within my Agile team |
| Agile innovation | Innovation about Agile practices | Many relevant new ideas on Agile practices/methods circulate within my team |
| Product discussion | Information exchange about product ideas | In my Agile team, we take the time to discuss ideas on product and new technologies |
| Agile discussion | Information exchange about the process ideas | In my Agile team, we take the time to discuss ideas on Agile practices and methods |
| Product learning | Learning about the product | In my team, learning activities are mostly devoted to boost our competence in product and technology domains |
| Agile learning | Learning about Agile | In my team, learning activities are mostly devoted to boost our competence in Agile practices/methods |
| Agile experience | The level of previous experience working with Agile | How long have you worked in Agile? Answers categorized into 5 types: less than 6 months, between 6 months and 1 year, more than 1 year, between 1 year and 2 years, and more than 2 years. |

## 5.4 Empirical Observations

In this section, we present our data in relation to the research questions formulated above, to specifically support the analysis of Agile teams' learning processes at the base of current organizational innovation performance. We report the results from a series of regression analyses of the survey data, and then the results for identified practices and

**Table 5.3** Regression with the dependent variable product innovation

| Model | | | | t | Sig. |
|---|---|---|---|---|---|
| | | Std. B | Std. E | | |
| 1 | (Constant) | | 0.314 | 6.951 | 0.000 |
| | Agile Experience | −0.119 | 0.069 | −1.900 | 0.059 |
| | Agile Innovation | 0.395 | 0.063 | 6.311 | 0.000 |
| 2 | (Constant) | | 0.420 | 2.949 | 0.004 |
| | Agile Experience | −0.114 | 0.068 | −1.861 | 0.064 |
| | Agile Innovation | 0.346 | 0.067 | 5.179 | 0.000 |
| | Product Learning | 0.174 | 0.073 | 2.837 | 0.005 |
| | Agile Learning | 0.120 | 0.066 | 1.803 | 0.073 |
| 3 | (Constant) | | 0.425 | 2.683 | 0.008 |
| | Agile Experience | −0.108 | 0.066 | −1.816 | 0.071 |
| | Agile Innovation | 0.327 | 0.068 | 4.819 | 0.000 |
| | Product Learning | 0.130 | 0.072 | 2.149 | 0.033 |
| | Agile Learning | 0.154 | 0.068 | 2.230 | 0.027 |
| | Product Discussion | 0.257 | 0.062 | 3.795 | 0.000 |
| | Agile Discussion | −0.162 | 0.074 | −2.162 | 0.032 |

performance related to different types of learning and innovation at the organization and team levels (Table 5.3).

### 5.4.1 Results of Regression Analysis

Tables 5.4 and 5.6 display the model summaries for the regression while the descriptive statistics are shown in Table 5.7. Table 5.3 shows the regressions and explains 25% of the variance (R2) in Product Innovation. The overall model exhibited in Table 5.5 explains 29% of the variance (R2) in Agile Innovation. Tables 5.3 and 5.5 present the results of the regression analyses of testing the relationships between the different types of learning and information exchange and the two types of innovation, i.e., product innovation and Agile innovation. In order to investigate research question 1, the control variables and the variables for learning and discussion were entered in a stepwise method. Model 1 presents the model with the control variables, Model 2 adds the learning variables, and Model 3 adds the discussion variables (Table 5.6).

The impact on Product Innovation is tested in Table 5.3. The coefficients of the control variable Agile Experience is negative and significant

**Table 5.4** Model summary for product innovation

| Model | Adj. R2 | Std. E | Change Statistics | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | R2 | F Change | df1 | df2 | Sig. | F |
| 1 | 0.165 | 0.823 | 0.173 | 22.030 | 2 | 211 | 0.000 | |
| 2 | 0.201 | 0.805 | 0.043 | 5.728 | 2 | 209 | 0.004 | |
| 3 | 0.247 | 0.781 | 0.053 | 7.484 | 2 | 207 | 0.001 | |

**Table 5.5** Regression with dependent variable Agile innovation

| Model | | | | t | Sig. |
|---|---|---|---|---|---|
| | | Std. B | Std. E | | |
| 1 | (Constant) | | 0.320 | 6.435 | 0.000 |
| | Agile Experience | 0.402 | 0.063 | 6.311 | 0.000 |
| | Product Innovation | 0.027 | 0.070 | 0.424 | 0.672 |
| 2 | (Constant) | | 0.401 | 4.077 | 0.000 |
| | Agile Experience | 0.329 | 0.063 | 5.179 | 0.000 |
| | Product Innovation | 0.035 | 0.066 | 0.584 | 0.560 |
| | Product Learning | −0.053 | 0.072 | −0.874 | 0.383 |
| | Agile Learning | 0.311 | 0.061 | 5.018 | 0.000 |
| 3 | (Constant) | | 0.411 | 2.568 | 0.011 |
| | Agile Experience | 0.308 | 0.064 | 4.819 | 0.000 |
| | Product Innovation | 0.026 | 0.064 | 0.442 | 0.659 |
| | Product Learning | −0.034 | 0.070 | −0.568 | 0.570 |
| | Agile Learning | 0.200 | 0.065 | 3.012 | 0.003 |
| | Product Discussion | 0.034 | 0.062 | 0.494 | 0.622 |
| | Agile Discussion | 0.252 | 0.070 | 3.532 | 0.001 |

**Table 5.6** Model summary for process innovation

| Model | Adj. R2 | Std. E | Change Statistics | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | R2 | F | df1 | df2 | Sig. | F |
| 1 | 0.151 | 0.826 | 0.159 | 19.992 | 2 | 211 | 0.000 | |
| 2 | 0.239 | 0.783 | 0.094 | 13.118 | 2 | 209 | 0.000 | |
| 3 | 0.291 | 0.755 | 0.058 | 8.703 | 2 | 207 | 0.000 | |

($\beta = -0.119$; $p < 0.10$), and the variable for Agile Innovation is positive and significant ($\beta = 0.395$; $p < 0.01$).

Adding the learning variables in Model 2 yields a positive and significant impact of both Product Learning ($\beta = 0.174$; $p < 0.01$) and Agile Learning ($\beta = 0.120$; $p < 0.10$).

**Table 5.7** Descriptive statistics

| | | Mean | Std. D | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Product innovation | 3.1 | 0.90 | 1 | | | | | |
| 2 | Agile innovation | 3.4 | 0.90 | 0.398*** | 1 | | | | |
| 3 | Product learning | 3.7 | 0.76 | 0.180*** | 0.012 | 1 | | | |
| 4 | Agile learning | 2.8 | 0.92 | 0.267*** | 0.396*** | 0.018 | 1 | | |
| 5 | Product discussion | 3.2 | 0.99 | 0.321*** | 0.275*** | 0.124* | 0.179*** | 1 | |
| 6 | Agile discussion | 3.2 | 0.91 | 0.140** | 0.400*** | −0.070 | 0.438*** | 0.440*** | 1 |
| 7 | Agile experience | 3.2 | 0.82 | −0.129* | −0.025 | 0.004 | −0.056 | −0.015 | 0.004 |

***$p \leq 0.01$ (two-tailed), **$p \leq 0.05$, *$p \leq 0.1$

In Model 3, the variables gauging discussion are both significant. However, they have opposite effects on Product Innovation where Product Discussion is positive ($\beta = 0.257$; $p < 0.01$), and Agile Discussion is negative ($\beta = 0.162$; $p < 0.05$).

The impact on Agile Innovation is tested in Table 5.5. The coefficients of the control variable Agile Experience is positive and significant ($\beta = 0.402$; $p < 0.05$), and the variable for Product Innovation is insignificant.

Adding the learning variables in Model 2 results in a positive and significant impact of Agile Learning ($\beta = 0.311$; $p < 0.01$). However, Product Learning has an insignificant impact on Agile Innovation. In Model 3, the variables gauging discussion are added. In this model, Agile Discussion has a positive and significant effect ($\beta = 0.252$; $p < 0.05$), whereas Product Discussion has an insignificant effect. To summarize, we can say that information exchange of product and process ideas and learning about product and process, respectively, tend to support either product ideas or process ideas. Hence, there are two different learning processes at play in Agile teams. Moreover, depending on whether the teams discuss Agile or product matters, this creates trade-offs for product innovation; Product Discussion facilitates Product Innovation and Agile Discussion hampers it. The notion of a trade-off between Agile and product innovation is further supported by the analyses in Tables 5.3 and 5.7, which show that teams with longer experience of Agile have fewer product ideas.

### 5.4.2 Innovation Performance

Product innovation performance was collected at the unit level and across units at the site level. It was measured as a number of patents. There are no indicators of process innovation performance allowing an understanding of trends; in fact, there was merely a perception that performance had improved since the introduction of Agile but they did not know whether they were producing too many process ideas. Empirical evidence of the relationship between use of Agile and innovation performance, distinguishing between product and process innovation effects, was obtained by observing longitudinal organizational product innovation performance. This information was enriched by data from numbers of system improvements and product ideas gathered in the organization tool devoted to the collection of innovative ideas (see Table 5.8), and information obtained via e-mail exchanges about the organizational process methods and tools departments on innovation process performance. Table 5.8 shows that there has been a progressive decrease in product/technology innovation performances since the transition to Agile. Local process methods and tools departments also confirmed that in relation to process innovation performance: “We see a clear indication that Agile way of working is a stimulus for tools and processes improvements proposals generation. In the old ways of working

**Table 5.8** Longitudinal product innovation performances from the three organizations

| Year | Number of patents | Number of product improvements | Number of product ideas collected |
|---|---|---|---|
| 2010 | – | 112 | 147 |
| 2011 | 23 filed applications | 100 | 80 |
| 2012 | 15 filed applications | 76 | 44 |

(waterfall) there were also such improvements suggested. But not that frequently and also the follow-up was not so strong as it is now. The main reason for the increase is they strive of the engineers to constantly optimize end-to-end 'flow efficiency' and this is highly dependent on optimally working processes and tools."

We explored other possible causes for these changes in product and process innovation performance trends. We identified (1) a major reorganization as a result of implementation of Agile which led the most system managers to migrate to the Agile teams from the beginning of 2012, (2) a small reduction in workforce numbers in all three organizations, and (3) the possibility for Organization B to participate in patenting activity from the beginning of 2012. However, none of these contextual variations would seem to justify our results, compared to the communicated barriers to learning and innovation.

The Intellectual Property Rights (IPR) department, which was responsible for all three organizations, reported that: "What we have heard from many inventors is that they do not have the time to file more applications due to the very strict time frame in their daily work (based on the scrum-concept)."

## 5.5 Analysis and Discussion

In this section, we present and discuss the results of the analysis of the data collected to address the research questions.

### 5.5.1 Impacts of Agile Methods on Innovation and Learning

We found a significant negative correlation (see Table 5.7) between Agile Experience and the number of product ideas generated by the teams. We noticed that this finding was also prevalent in the regression analysis in Table 5.3. In other words, teams with longer experience of working with Agile methods produce fewer product ideas. We also noticed that Agile Experience has a positive and significant impact on process innovation. Further, we can say that information exchange of product and process ideas and learning about product and process, respectively, tend to support either product ideas or process ideas.

Therefore, two different learning processes are at play in Agile teams. Information exchange about products shows a positive and significant relationship with product innovation but is nonsignificant for process innovation. Information exchange about processes has a significant negative impact on product innovation but a significant positive impact on process innovation. These findings support the fundamental notion of an underlying trade-off between Agile practices and product innovation. This research seems to offer novel results for Agile methods although the notion of inherent trade-offs in organizational research is well-established (cf. March 1991), and Cantarello et al. (2012) proposed the idea of organizational ambidexterity to resolve the tensions related to the nature and proximity of knowledge.

The objective of this paper was to determine which elements were relevant to understand the product and process innovative efforts to highlight possible explanations of different collected innovation performances achieved across the Agile transformation by the organization. The study focuses on expanding our knowledge on the effects of Agile on the process and product innovation.

These findings support that learning and interaction processes, for processes and products, create trade-offs between product and process innovation which is in line with the previous research, e.g., Callois (2008). This indicates that increased experience with Agile methods may squeeze out product innovation, and in addition, Agile favors attention to process-related learning and information exchange in Agile teams. This work extends the existing research on the impact of process management on technological innovation, by using the Agile team rather than the firm as the unit of analysis, which contrasts with the study by Benner et al. (2002), which shows that attention to process management increases the technological innovation that exploits current firm knowledge.

## 5.6 Conclusions and Implications

We found that (1) respective information exchange of product and process ideas and learning about product and process tend correspondingly to support product ideas or process ideas, (2) depending on whether the teams exchange information about processor product matters, this creates trade-offs for product innovation, (3) product information exchange facilitates product innovation, and Agile information exchange hampers it, (4) increasing experience with Agile methods tends to squeeze out product innovation, and (5) the use of Agile methods facilitates process learning and information exchange in Agile teams.

The aim of this study was to identify which variables were relevant to explain differences between product and process innovative efforts within the total domain of variables reported in the literature and highlighted during the interviews as being important for innovation. Finally, five variables remained as independent predictors of innovation activities: process and product information flow, process and product learning, and Agile experience. We have observed ambidexterity in Agile contexts using an exploratory approach, and more fine-grained units of analysis such as the Agile team. Further avenues of research lie in a deeper and more thorough analysis of the implications of the research in the contributions to the ambidexterity literature, as the setting and the unit of analysis provide an interesting point of view on the need to exploit and explore knowledge bases.

We would like to remind the reader that our exploratory study is based on a relatively small sample of one kind of firm. Further research is needed to determine whether the outcomes hold for innovative efforts in other sectors of the industry.

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# Part II

## Innovating: Structural and Strategic Issues

# 6

# The Role of Networks for Innovation in Temporary and Project-Based Organizations

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## 6.1 Introduction

In 1934, Schumpeter proposed a first definition of innovation as a new combination of productive resources. Since then, the concept of innovation has changed and several authors define it in terms of exchange or interactive processes, such as Kline and Rosenberg (1986), that defined innovation as an interactive process involving relationships among different actors, Patel and Pavit (1994), that underline the process of exchanging codified and tacit knowledge, or even Edquist (1997),

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that has defined it as an interactive process of learning and exchange where actor interdependence generates an innovative system or a cluster (Edquist 1997).

What is widely recognized is that innovation occurs frequently under interfirm umbrellas (Pennings and Harianto 1992a) and that in many industries innovation creates interdependency among firms. Linkages are, indeed, of strategic importance (Pennings 1981; Pennings and Harianto 1992a, b). This phenomenon is associated with an increasing uncertainty, complexity of technology bases and level of technological sophistication, and cross-fertilization (Freeman 1991; Hagedoorn 1993; DeBresson and Amesse 1991; Powell et al. 1996; Shan et al. 1994).

Firms opt for cooperative efforts in order to reduce the uncertainty associated with the generation and commercialization of novel products or markets rather than selecting the path to organic growth, so that the establishment of different types of cooperative interorganizational relationships (Oliver 1990) is common. Indeed, in the strategy field, a logic of dyadic relationships is often prevailing, and those who study the business community are more likely studying alliances, interorganizational relationships, coalition, or collaborative agreements (Provan et al. 2007). Benefits of sharing resources such as skills, knowledge, and information have long been argued by scholars (Hamel et al. 1989; Perks and Easton 2000; Kogut 1988). Moreover, this web of relationship provides access to the technological knowledge of partners and leverage complementary assets (Teece 1992).

Literature converges toward the idea of the benefits of strategic technological alliances on innovative output, especially on patent and new product development. Following Podolny and Page (1998), nevertheless, different forms of cooperation agreements among two or more actors pursuing a collaboration and lacking a legitimate authority can themselves be thought as a network form of organization (examples include ventures, alliances, business groups, franchises, research consortia, and outsourcing agreements).

Stemming from Laumann's et al. (1978; 458) definition of networks as "a set of nodes (people, organizations) linked by a set of social relationships of a specified type" that generalized to organizations the network concept, relaxing Mitchell's (1969) definition based on network of individuals, networks have been broadly studied by scholars that have observed nodes, ties, and outcomes of different typologies. Over time, they have been defined as "dynamic," in which components are continuously assembled to match changing competition (Miles and Snow 1986); "strategic" when created as long-term agreements to gain or sustain competitive advantage (Jarillo 1988; Gulati et al. 2000); "interfirm" when intended as a way to organize the economic activity via interfirm collaboration (Grandori and Soda 1995).

Finally, with respect to innovation, scholars have defined "networks of innovators" as those sets of interorganizational linkages that appear suitable to foster technological transactions, market for technologies, and for R&D development (DeBresson and Amesse 1991). Resources that are pivotal for innovation are frequently found within the network of the firm, and not internally (Arora and Gambardella 1990; Freeman 1991; Powell et al. 1996; Afuah 2000). In this light, Powell et al. (1996) in their work on networks of learning, defined networks as loci for innovation, as they provide fast access to external information and resources and stimulate the development of internal expertise and learning capabilities. Gulati (1999) also underlines the role of networks as the alternative access to resources that are not readily available through market exchanges.

The structural characteristics of network and the position of firms and actors within them are also of pivotal importance, as they influence firm behavior and outcomes (Powell et al. 1996, 1999; Walker et al. 1997). With reference to innovation and technology development, networks offer two substantial benefits, as identified by Ahuja (2000), that can be traced into resource sharing and combination of different knowledge and skills and within the access to knowledge spillovers; the first enabling transferring assets, resources and know-how, and the latter facilitating transfer of information.

These issues appear particularly important in the context of temporary and project-based organizations, that repeatedly bring together external resources and knowledge to attain short-term rather than sustainable advantages. More specifically, project-based teams in temporary organizations give rise to a large latent network at the industry level whose virtue is that it can provide the means whereby a group of specialists that have previously worked together can efficiently reconstitute the network (Lampel et al. 2000).

The aim of this chapter is to review existing literature discussing the role of networks for innovation and reflect upon the peculiarities related to temporary and project-based organizations. Authors aim to address some of the critical issues related to a better understanding of how diverse network structures impact on innovation. Indeed, literature has highlighted that an "optimal" network structure is difficult to identify, as the context in which the network is embedded, the characteristics of the actors and the object of their relationships (Ahuja 2000) vary widely across industries and time.

## 6.2 The Role of Networks for Innovation

The main streams of literature analyzing innovation networks creation drivers can be found in the Schumpeterian dynamics, not only in the transaction costs analysis and learning processes analysis (DeBresson and Amesse 1991), but also literature based on formation of trust (Zaheer et al. 1998). Reference to the Schumpeterian dynamics is made in terms of the opportunities, provided by networks, to recombine various components and meet the new technical combinations required by innovation. Transaction costs analysis refers in this contest to technological transactions; networks can overcome the problems arising from systems interdependences, indivisibilities, asset specificity, and tacitness of knowledge (DeBresson and Amesse 1991). According to the knowledge-based perspective, networks allow leveraging collective knowledge to generate advantages based on superior innovation capabilities (Capaldo 2007). This process is often lead by firms that are able to create new and more diverse ties, mastering access to different sources of information. On the other side, trust is also a driving factor of innovation network creation, as firms are more likely to engage in interorganizational networks based on relational trust, which is positively associated with prior interactions with partners (Brass et al. 2004). More generally, innovation networks seem to be generated by three main phenomena (DeBresson and Amess 1991). The first one, on which most of the literature agrees, is the existence of technological and market uncertainties that require the search for new opportunities and trust enhancement; the second one is connected to the systems dimension of technology, that involves the need of acquiring sets of complementary resources and knowledge that often reside in the network; finally, firms enter R&D networks as collaboration enhances innovation outcomes.

The potential to explore and exploit the benefits of networks for the innovative performance is connected to the network structure. Literature has been arguing about the "ideal" structure of the network for decades (Brunetta et al. 2015). The main, well known, debate in this light is that between Burt's (1992) view of brokerage and Coleman's (1988) view of closure. According to Burt (1992), the firm should focus on maximizing the number of bridges—meant as edges connecting two actors and linking different components of a network—in order to increase the diversity of contacts. His argument draws from the consideration of brokerage opportunities, as in Granovetter (1973) or the ideas on betweenness centrality of Freeman (1979). By maximizing the number of structural holes, the circulation of information is less redundant, in terms of lower cohesion (contacts that, being strongly connected provided redundant information benefits) and lower structural equivalence (so, contacts with the same sources of information) (Burt 1992, 1997, 2001). Non-redundant ties, on the other side, lead to additive information. Being the structural holes the gaps between non-redundant contacts, actors should aim at spanning the structural holes, keeping strong relations with actors on both sides of the tie. The more the holes spanned, the richer the information benefits give the possibility to access to a wider information pool (chance to identify opportunities), gather information quickly (ability to identify which needs in a group could be fulfilled with skills in another group), and benefit of referral benefits (the broker is more easily included in new opportunities). Moreover, on the control side, the actor plays the role of the broker, thus the more the structural holes spanned, the higher the opportunities. To generate more innovation, therefore, according to this view, the network should be structured with higher structural holes to increase the diversity of information and enlarge the exchange of knowledge (Rogers 2003; Capaldo 2007).

Nevertheless, uncertainty arising from perceiving many alternatives with respect to the occurrence of an event—and the probabilities of the alternatives themselves—is strictly connected to the search for information (Rogers 2003). This is even more evident in the context of innovation, generating one type of uncertainty connected to the perception of newness given by the innovation itself (Rogers 2003).

In this light, a stream of literature supports Coleman's (1988) ideas on the importance of the closure of network (related to the existence of strong ties among actors), in conditions of uncertainty; specifically, in situations in which the collaboration is needed to achieve individual goals but there is uncertainty on the availability of such collaboration (Gargiulo and Benassi 2000). This, because the closure of the network is meant to enhance trust and cooperative exchanges (Coleman 1988). When actors trust each other, the uncertainty about exchanges is lower, because actors are embedded in a web of relations, institutions, and culture. Closure facilitates trust, and trust enables information transfers and collaborative arrangements (Uzzi 1997). Moreover, research has demonstrated that strong ties stimulate knowledge sharing by facilitating knowledge flows (Dyer and Nobeoka 2000).

Within this debate, an "optimal" network structure is difficult to identify, as the context in which the network is embedded, the characteristics of the actors and the object of their relationships (Ahuja 2000) vary widely across industries and time. Both views present some limitations: first, benefits arising from structural holes are limited to the extent of the presence of network constraints: an actor cannot maintain the structural advantages when other actors follow its behavior (Burt 1997; Buskens and van de Rijt 2008). Burt suggests that the presence of constrains, undercuts the ability of the actor to develop entrepreneurial action (Burt 1997). Second, closure might limit the adaptation capability in light of the presence of a strong mechanism of mutual and reciprocal influence, limiting the establishment of new connections (Soda and Usai 1999; Gargiulo and Benassi 2000). This limit can be identified with the paradox of embeddedness (Uzzi 1997), defined as the "economic action that is affected by actor's dyadic relationships and by the structure of the overall network of relations" (Granovetter 1985: 33): if all the actors within the network are connected, the network becomes rigid and ossified, locked away from the demand of its environment.

Several authors (Uzzi 1997; Podolny and Baron 1998; Gargiulo and Benassi 2000; Capaldo 2007) argue the necessity of a contingent view over network structure, according to the composition of the network and the content of the ties; integrating different types of ties (strong and weak) within the same network leads to the idea of a contextual exploration and exploitation, leading to different innovation performances of firms (Capaldo 2007).

## 6.3 Implications of Network Structure for Innovation in the Context of Temporary and Project-Based Organizations

Network structure exposes the temporary organization to different stimuli, ideas, information, and opportunities, giving the project the possibility to attain superior performance. The environment in which the network is embedded and its structure define the opportunities potentially available to it (Uzzi 1997), but, as just stated, it is the position of the actor that may or may not give access to those unique opportunities.

Networks rich in structural holes seem to be preferable in a quest of good and novel ideas (Burt 2004) and may favor the insertion of new expertise and novel combination of existing ideas, increasing the innovation potential of the temporary organization. Temporary and project-based organizations bring together individuals who work interdependently on complex tasks within a brief time lag and at potentially short notice. Learning in these organizations requires informational advantages and novelty to be developed: actors can exploit an advantageous network structure to access knowledge and information from alters (Gulati 1995, 1998; Podolny 1994; Nahapiet and Ghoshal 1998). Connecting with new partners, spanning structural holes, and joining around new ideas (Obstfeld 2005; Powell 1996) provide fertile ground to perform the project and reach the needed novelty and coordination.

At the same time, temporary and project-based organizations must rapidly pull together external resources to attain short-term performance, rather than sustained advantages. These organizations need to exploit specialized skills but keep the coordination to minimum costs and time (Bechky 2006): trust among members can enable projects to activate fast and effective reciprocal coordination mechanisms. In this light, actors may follow a union strategy, and create value by connecting their partners—rather than brokering the connections, and therefore closing the structural hole (Beker and Obstfeld 1999). The creation of these conditions for the exchange of information (Gulati 1999; Hansen 1999), problem solving (Ahuja 2000; Reagans and Zuckerman 2001), and effective knowledge sharing (Uzzi 1997; Walker et al. 1997) is a necessary step, but not sufficient, to guarantee a significant project's performance in temporary organizations. Indeed, an high closure can lead to a lack of novelty and an "idea problem" (Obstfeld 2005): the collaboration is facilitated, but generation of new ideas is limited.

The temporary, or project-based nature of these organizations poses a critical issue related to the time lag available to develop a network strategy. Alignment is problematic due to the fact that temporary and project-based organizations must start-up and be operative rapidly. Temporary and project-based organizations need to mobilize resources and activate connections rapidly in order to perform complex tasks. Having a network rich in structural holes, despite being beneficial for the idea generation, can hinder the coordination needed to execute novel ideas within the project, as members that are weakly related may present strong dissimilarities (Obstfeld 2005) and time does not allow creating the cohesion needed. This problem, is defined as "execution problem" (or "action problem," see Obstfeld 2005). The generation of the relevant components of an innovative product can therefore be hindered, and the resulting novelty be below its potential.

## 6.4 Conclusion

In sum, temporary and project-based organizations embedded in hyper-competitive settings can either favor open network structures, aiming at the circulation of new expertise and novel combination of existing ideas to increase their creative potential or otherwise pursue dense structures, fostering collaboration among specialists who have previously worked together (Lampel et al. 2000; Zaheer and Soda 2009) and exploit the network as a repository of knowledge.

An actor chooses to connect or disconnect upon the network contingencies and its strategic orientation. Its behavior is a precursor of a following change (Buskens and van de Rijt 2008). Focusing on temporary organization, we have highlighted that due to the temporary nature of the projects, changes in the surrounding environment and the quest for creativity and coordination may lead the organizations to try to overcome the constraints imposed in the short term.

The aim of this review was to reflect upon and offer ground for theorizing on the role played by specific network structures within hyper-competitive settings made of organizations whose advantage is temporary rather than sustained. Some managerial implications can also be drawn from this study. Temporary and project-based organizations leverage strategic resources from an open community of independent professionals. It is important to search for the right balance between network structures in order to boost project performance of team members involved in specific projects and for the selection of the people to involve in the projects themselves. Opportunities to access diverse knowledge and information and to enhance innovation versus the chance to foster trust and coordination opting for closed structures shall be weighted carefully.

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# 7

# Project Social Capital in Biotech R&D: Its Configuration and Impact on Knowledge Development

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## 7.1 Introduction

Project-based organizing of company operations is pervasive in today's economy (Cattani et al. 2011). The last twenty years have witnessed a growing scholarly interest in project-based organizations (PBOs), and this interest mirrors the diffusion of this organizational form across a wide range of industries, well beyond those where organizations traditionally have been organized by projects. Examples of research in this

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area have focused on film-making (Stjerne and Svejenova 2016), media (Manning and Sydow 2011), oil and energy (Prado and Sapsed 2016), complex products and systems (Hobday 2000), software development (Grabher 2004), construction (Bresnen et al. 2004), professional services and consulting (Semadeni and Anderson 2010), engineering design (Cacciatori 2008), and biotechnology (Ebers and Powell 2007).

Project-based organizations (PBOs) are organizational forms that create temporary arrangements and systems through which firms provide services or products to their clients, by developing customized projects (Prado and Sapsed 2016). The temporary nature of PBOs is seen as a response to the increasingly complex environments that many organizations are faced with today (Powell et al. 1996).

The PBO seems to offer positive conditions both for creating new knowledge and to foster creativity and innovation (Davies et al. 2011). Involving autonomous and interdisciplinary teams, holding less cumbersome hierarchies, and being able to find solutions in a short and intensive period of time (Bakker et al. 2016), PBOs achieve innovation by creating and recreating organizational structure depending on the demand of each project and responding quickly and flexibly to customer needs (Hobday 2000).

Thanks to this ability to realize innovation in collaboration with clients and suppliers, PBOs allow better process control (Manning and Sydow 2011), lead-time reduction (Verona and Ravasi 1999), improved output quality (Bresnen et al. 2004), have more flexible application and integration of different types of organizational knowledge and skills, improve learning within the project boundaries, provide higher effectiveness in outward knowledge transfer (Lichtenthaler 2010), and cope with emergent properties in production (Keegan and Turner 2002).

In spite of these advantages, the temporary nature of projects raises tensions and questions that lead to considerable drawbacks, occurring especially where traditional functional or matrix organizations are strong, i.e., in performing routine tasks and achieving economies of scale (Hobday 2000). In addition, PBOs face a recurring tension between the always immediate demands of the project and the opportunities for learning and disseminating best practices and innovations (Sydow et al. 2004). Given the particular discontinuity of activities carried out in PBOs, these have a weakness concerning organizational learning from project to project (Prencipe and Tell 2001). Much of the knowledge generated in project activities is embedded in the tacit experiences of group members and it is therefore difficult to consolidate this knowledge and spread it outside the single project. Moreover, the knowledge that is accumulated during the course of a project is at risk of being dispersed in a non-productive way as projects are dissolved and members are assigned to new tasks and teams (Prencipe and Tell 2001). As stated by Davies and Brady (2000), the paradox is in the fact that to make the temporary aspects of a project become part of a permanent learning process for the organization, managers need to understand "economies of repetition." To learn from projects, organizations undertake some patterns of activities that can be predictable and repeatable, leading to a more efficient and effective performance. This means that in PBOs, economies result more from the repetition of similar types of projects than from a scale or scope (Davies and Brady 2000).

In order to handle the negative aspects of PBOs presented above, increasing emphasis is put on inter-project coordination and learning, e.g., in terms of multi-project management (Cusumano and Nobeoka 1998). By extending the management focus from single projects to families or portfolios of projects, mechanisms for purposefully transferring knowledge from one project to others can be implemented, and unnecessary redundant work can thereby be avoided. A limitation of the multi-project management approach, however, is that it normally only comprises the formal dimension of project-based organization. This excludes an important part of organizational learning, namely all the coordination and innovation that takes place informally, which—particularly in knowledge-intensive settings such as R&D—is known to be of great importance (Obstfeld 2005).

Projects are not "islands," but are connected to their surroundings in intricate ways (Grabher 2004). The integration potential residing in contacts and communication between projects arguably constitutes a source of extended resources for a given single project, and could also have an effect on its performance (Manning and Sydow 2011). In order to achieve integration effectively, a project needs to establish and maintain relations with other projects both within and outside the organization to pull in important knowledge resources that can be used to improve project performance. In order to realize this potential, we need to consider projects as being embedded in their organizational surroundings, and attend to their formal and informal external linkages as potential resources (Bakker et al. 2016). Drawing upon recent literature in the field of social networks, we use the concept of project social capital proposed by Di Vincenzo and Mascia (2012) as a fruitful way of capturing this potential for integration and learning residing in a project's external linkages. The aim of this article is to empirically investigate the impact of projects' social capital for their knowledge development.

## 7.2 Theoretical Background

In this research, we choose to use the concept of project social capital, defined as the overall web of interpersonal and interorganizational relationships in which single projects are embedded, and through which important resources can be accessed (Di Vincenzo and Mascia 2012). The concept of project social capital aims to highlight a form of social capital which inheres specifically in temporary forms of organizing.

The importance of project social capital relies upon a number of studies which have stated that projects are more than just temporary systems (Arthur et al. 2001; Sydow et al. 2004), in light of the complex web of interdependences they manifest with social relationships, localities, and corporate networks, and from which they mobilize essential resources (Grabher 2002a, b; Sydow and Staber 2002). Moreover, social relationships are frequently project-specific since they are formed around project boundaries rather than around the boundaries of their respective firms. In a number of industries, single projects collaborate closely with relevant external actors while, at the same time, they become more loosely tied to the central management of the company in which they actually take part. Grabher (2002a) proposed the term "project ecology" to identify those interpersonal and interorganizational relationships from which projects draw essential resources. Projects often become locally embedded since they "operate in a milieu of recurrent collaboration that, after several project cycles, fills a pool of resources and gels into latent networks" (Grabher 2002b: 208).

Within PBOs, project teams represent groups of people aiming to achieve well-specified objectives, in which members are aggregated in order to draw upon the joint resources of these individuals. Among such resources, social capital available through individual members' social relations appears to be of critical importance given the peculiar work performance and work processes at the project level. Whenever project tasks require new relevant knowledge located outside the project boundaries, individuals taking part in projects may be strongly motivated to communicate and exchange knowledge with members who take part in other projects, in order to have access to new knowledge. Project social capital in this context has a double effect: the interpersonal social relationships established across different, well-focused projects enhance the absorption of innovative external information that improves learning in the area of work and, as a result, the knowledge development and resulting outcomes within each individual project.

An important perspective that needs to be taken into account in project-based contexts concerns the relationship between cognitive diversity of project members and knowledge development at the project level (Cummings and Kiesler 2007). Diversity is an important characteristic of projects, whose members may bring diverse knowledge, expertise, information, and perspectives in order to perform organizational tasks and activities (van Knippenberg and Mell 2016). At an individual level, knowledge diversity is shaped by the functional background of project members, as well as by their previous work experiences. Following the arguments of project social capital, the discussion about cognitive diversity relates directly to the collaborative ties that project members may establish with other colleagues specialized in different areas of expertise. While similarity in the stock of knowledge owned by individuals can, to some extent, improve communication and commonality among them, certain levels of heterogeneity can enhance the capacity for creative problem-solving and allow individuals to share different sets of contacts, skills, information, and experiences (Reagans and Zuckerman 2001).

Network diversity is defined as the prevalence of ties that cross institutional, organizational, or social boundaries (Burt 1992). It does not take into account the number of actors, but rather the number of different types of actors. The greater the number of different types of actors to which an individual taking part in a single project is linked, the greater the diversity of information and social support that the individual in question can have access to (Burt 1983). In this research, we consider cognitive diversity in terms of both the different project members' areas of expertise and the degree of presence/absence of relations with heterogeneous project members. Each area of expertise can be viewed as a distinct pool of knowledge possessed by individuals affiliated with other projects. Network diversity reflects a property of the project social capital that takes into account the extent to which project members' interpersonal networks are rich in "cognitive diversity." Individuals are chosen and assigned to single projects on the basis of their specific competences and past experiences. Such capabilities are often represented by the functional units that overall represent the permanent part of the organizational chart. Projects that have connections across multiple pools of knowledge bridge holes between projects in the broader "community" of knowledge at the organizational level, and as a result, they are exposed to knowledge that is more diverse.

The property of diversity is of crucial importance for project social capital. Intense and frequent communication among members is normally a highly desirable condition within project teams (Obstfeld 2005), and typically these are designed with the intent to achieve homogeneity and cohesion among individuals pertaining to the same project. In contrast, connections with members of other projects who have a different background enhance an individual's capabilities to interpret ideas from people with different knowledge in a way that suits his or her knowledge and experiences. At the same time, through "different" ties, individuals can more easily transfer what they know to others with different backgrounds. The ability to transfer knowledge effectively leads to higher exposure of projects to a broader set of perspectives and cross-fertilization of ideas, and thus to variation in knowledge and problem-solving approaches which can help project teams identify and use multiple knowledge components in their activities. In other words, projects with exposure to more diverse knowledge through their members' interpersonal networks will have access to a wider range of knowledge components and will be able to mobilize and exploit different intellectual resources embedded in the network. As a consequence, it is likely that a broader diversity of social networks will be associated with higher levels of knowledge development.

However, although networks across disciplines can be beneficial, excessively high levels of network diversity can be problematic. First, to the extent that knowledge is transferred across boundaries that demarcate distinct bodies of knowledge, it is unlikely that individuals on opposite sides of a boundary will have much knowledge in common. Cohen and Levinthal (1990) labeled the ability to assimilate and replicate new knowledge gained from external sources as "absorptive capacity." In discussing how this contributes to innovation, they argued that absorptive capacity tends to develop cumulatively and builds on prior-related knowledge. High levels of network diversity could result in a lack of common knowledge among linked projects, thus decreasing absorptive capacity and making attempts to transfer knowledge across the boundaries vulnerable. A lower ability to transfer knowledge will in turn reduce opportunities to gain access to different cognitive strategies and others' experiences, diminishing the potential for knowledge development.

Turning to other works in the broader field of innovation management, we can also here see that the proposed effects of diversity are not straightforward. Whereas most of the literature on creativity highlights the importance of heterogeneous ties, some authors point to the risk of diversity becoming a double-edged sword, where too high levels of diversity can have adverse effects on creative performance as it may bring about misunderstandings, and possibly also conflicts (Milliken and Martins 1996; Pelled et al. 1999).

As pointed out already in the seminal work by Lawrence and Lorsch (1967), high performance in organizations is achieved when there are high levels of both differentiation and integration, and the latter is the result of using certain integration mechanisms. Hence, in order to manage a team with high diversity, there is a need for increased integration. Moreover, as organizations find themselves situated in increasingly complex environments, systems theory informs us that the organizations in question, too, must increase their requisite variety in order to accommodate the resulting variation and knowledge needs. In addition, research highlights the importance of requisite variety for innovation, while at the same time they argue the need for redundancy (Liebeskind et al. 1996; Reagans and Zuckerman 2001). To handle these paradoxical ideas, Bhidé (2000) proposes a modification of the theory proposed by Lawrence and Lorsch (1967), arguing that there is an optimal level of diversity in organizations as the costs related to increased diversity, in terms of conflicts and/or necessary integration efforts, may actually exceed its benefits.

Building upon this discussion, the goal of the present research is to explore whether and to what extent the levels of project diversity can have both positive and negative effects on knowledge development, and if it, therefore, appears fruitful to avoid both low levels of diversity and excessively high ones.

## 7.3 Methods

### 7.3.1 Research Setting

To test our hypotheses, we explored structural properties of project social capital and the degree of knowledge development of a population of 53 biotech R&D projects located at one of the most important science parks in Sweden. Of all the projects considered, seven were academic and related to different university departments, the rest related to several pharmaceutical companies involved in the biotech industry. We chose this particular setting for a number of reasons that we will now explain in more detail.

First, the adoption of "temporary systems" through project-based forms of organizing is important in this field given the increasing instability and uncertainty under the environmental conditions which organizations have to deal with (Whitley 2004; Zeller 2002). Biotechnology is a high-technology industry, characterized by radical innovation, adaptation pressures, and frequent alliances between large pharmaceutical firms and new biotechnology firms (Powell et al. 1996). Biomedical innovation has been defined in various ways, but here we see it as a process involving the creation and application of scientific and technological knowledge to improve the delivery of human health care and the treatment of disease. Biomedical innovation processes have been described as typically nonlinear or "interactive," comprising complex, uncertain, high-risk, and iterative cycles of knowledge integration and networking across diverse groups and organizations (Powell et al. 1996). Given this backdrop, the adoption of a temporary project structure allows strategic flexibility within organizations undertaking biomedical research and commercialization. Although it is primarily adopted by academic institutions and start-ups and new ventures, previous studies have also reported the "projectification" tendency for pharmaceutical companies in this field through the establishment of cross-functional autonomous units (Zeller 2002).

Second, biotech R&D is an ideal setting to study project social capital because it has widely been recognized as a context in which the social capital is an important performance determinant (Maurer and Ebers 2006). The social exchange relationships that are supported by trustworthy behavior "…play an important role in promoting organizational learning and in fostering organizational flexibility" (Liebeskind et al. 1996: 438) through increasing knowledge integration and reducing rivalry among research actors. Ample evidence has been provided that such benefits concern actors of different types and at different levels, such as scientists and academic researchers (Liebeskind et al. 1996), individual firms and organizations (Powell et al. 1996), as well as single projects (Zeller 2002; Whitley 2004). Networks of project teams represent, in particular, an important mechanism through which organizations involved in innovation processes acquire and create relevant expertise.

In this sector, technology development is particularly boundary spanning since sources of expertise are widely dispersed (Powell et al. 1996). Firms often take the decision to delocalize project units in order to better benefit from the relationships they may establish with other important knowledge sources. Proximity to actors external to firms serves these firms' capability to scan and absorb externally produced knowledge and technologies, which are extremely localized. The literature on localized knowledge spillovers and regional innovation suggests that research projects and teams in close geographical proximity are likely to be more productive than more dispersed teams (Audretsch and Feldman 1996). Especially in the biotech industry, knowledge, ideas, and innovation appear to be extremely localized spatially (McKelvey et al. 2003). Here, personal networks seem strongly rooted in a particular locality, giving rise to a number of benefits for organizational project units, e.g., the reduction of communication costs and a higher efficacy in the transmission of tacit knowledge as a result of the possibility of having frequent face-to-face interaction (Ebers and Powell 2007).

Projects often become highly embedded in a complex web of interdependences manifested in social relationships, localities, and corporate networks, from which they mobilize essential resources (Sydow and Staber 2002). In light of these interdependences, which projects frequently exhibit in this specific sector, it is likely that "organizational boundaries of projects operating within or across different firms (…) are more often decisive as boundaries of the respective firms" (Grabher 2002a: 246).

In this chapter, we analyze project social capital in a particular "project ecology" (Grabher 2002a) which comprises all exchange relationships established between co-located projects in one of the most important science parks in Sweden. Science parks are regional innovation policy instruments that aim for the effective transfer of public knowledge to high-technology-based firms in a well-defined geographical area (Storey and Tether 1998). A number of instruments and tools are often put in place to increase the concentration of knowledge-based actors and in turn the production of innovation at the local level. Facilities can, for instance, be set up to facilitate the location of research units in close vicinity of important universities or public laboratories, and business services are provided for those who aim to start or already have established new technology-based firms. Firms are encouraged to locate laboratories, research units, or entire projects in science parks because of the increasing possibility to collaborate with important academic institutions, around which science parks are usually established, as well as to gather prestige and visibility in the business community (Felsenstein 1994).

### 7.3.2 Data Collection

In the present study, the single temporary project is the unit of analysis. The present analysis is developed both with the support of primary data collected through a questionnaire-based survey and with the use of secondary data already available. In particular, primary data relate to the collection of information about the structure of single projects' social capital. In this vein, pilot interviews with project leaders allowed us to make assumptions, develop the methodology of investigation, and make a pre-test of the subsequently administered questionnaires.

A sociometric questionnaire, structured into different sections, was administered during the summer and late fall of 2003 to project managers and team members in order to gather relational data about each investigated project. In the first section, each project manager was found to indicate inter-project exchange relationships. We developed a set of questions in order to see how the project units exchanged informational resources with other actors in the science park. An example of the questions we asked is: "Has your project unit conducted repeated exchanges of information/resources with other on-park tenants through, for example, shared research programs, rotation of researchers or Ph.D. students, joint presentations, or meetings? If yes, please indicate the name of organizations, specific projects, or other tenants within the science park that were involved in this collaboration." The questionnaire was designed to gather data about technical inter-project relationships. The project members were given a questionnaire and asked to indicate with whom they usually discussed three predefined matters integral to project activities: (1) the major *source* for the development of the project activities, (2) the current dialogue and *exchange of opinions* about the development of the project, and (3) the *utilization* of specific knowledge to develop specific parts of their work. We obtained valued relational data between members of each project, since the average frequency of the interaction on a weekly basis during the last year was also checked.

There are a number of proxies for the success of biotechnology projects, including measures such as net margin, revenue growth, employment growth, and patenting rate (Maurer and Ebers 2006). In the present study, given the R&D nature of the investigated project activities, we considered the number of patents granted by each project as a proxy for project knowledge development. Using patent data also allowed us to identify project members' contribution to the innovation performance, measuring knowledge development at project, rather than organizational, level. Data on patents of biomedical projects were obtained through direct interviews with project leaders, and later complemented by two major patent databases. Another archival material available from project leaders was used to collect additional project data concerning tenure and project teams' composition.

### 7.3.3 Variables and Measures

*Dependent variable* Our dependent variable is represented by project knowledge development, measured as the number of patents granted. Prior studies consistently suggest that the number of patents is a key indicator of innovation performance, whenever performance is investigated at different levels of analysis. In a study of 258 R&D professionals, Keller and Holland (1982) found that the number of patents granted to each surveyed individual was positively and significantly associated with both superiors' ratings of performance and self-ratings of performance. In a recent study of 1200 companies, Hagedoorn and Cloodt (2003) documented that the number of patents is an indicator that captures the organizational innovation performance. The usage of the number of patents has also been shown to be fairly appropriate as a performance indicator at the project level (Linton et al. 2002).

Data were gathered by querying two large international databases which contain a large amount of detailed information about patents granted: the European Patent Office (EPO) and the World Organization for Intellectual Property (WIPO). We collected patent data by counting the number of patents for each surveyed project during years 2003 and 2004. To evaluate project performance more accurately, we recorded the patent application date rather than the time of invention. The time that elapses between the date of a completed invention and the patent application date has been shown to be no more than 2–3 months, and thus the patent application date is a good time proxy for when the invention occurred. We note here that, in both of the abovementioned databases, application dates are recorded only for those patents that are finally granted, and thus that all patents recorded by application date are patents that were also granted. Extant research suggests that even the total number of submitted patent applications is an ideal proxy of knowledge development at project level (Cummings and Kiesler 2007). We thus decided to complement our analysis by using as dependent variable the number of submitted patent applications in the period 2003–2004. Data on submitted patent applications were self-reported by project leaders in the course of interviews we conducted. The findings (not shown) obtained from a separate analysis conducted on these additional data were qualitatively similar to those described below.

*Independent variable* Our indicator measuring the level of diversity of project social capital is *Network range* (Burt 1983). Projects are surrounded by a "diverse" network to the extent that their members spread their network ties across multiple areas of expertise and the connections within contacted areas are weak. Network range has two distinct components. The first is a function of how project members' ties are spread across different areas of knowledge and expertise. The second is a function of the strength of connections with projects working in those areas. Thus, network diversity is defined as:

$$NR_{ij} = 1 - \sum_{k=1}^{N} v_k v_{ik}^2$$

where $v_{ik}$ is the strength of the network connection from member $i$ to area $k$, and $v_k$ describes the strength of the connections between projects in area $k$, while $v_{ik}$ is in turn defined as:

$$v_{ik} = \frac{\sum_{j=1}^{N_k} x_{ij}}{\sum_{q=1}^{N} x_{iq,\, q=j}}$$

where $N_k$ is the number of ties that project $i$ has with other projects working in area $k$, $N$ is the total number of network relationships of project $i$, and $x_{ij}$ is the number of ties that project $i$ has with project $j$. Tie strength $v_k$ within area $k$ can be expressed as follows:

$$v_k = \frac{\sum_{j=1}^{M_k} x_{ij}}{\sum_{q=1}^{S_k} x_{iq,\, q=j}}$$

where $S_k$ is the number of contacts that a given project maintains in area $k$, $M_k$ is the number of projects with expertise in the area $k$, $x_{ij}$ is the intensity of the relationship between a given project in area $k$ and any project, and $x_{iq}$ is the intensity of the relationship between a project member in area $k$ and a project member working in the same area of research. Therefore, increasing $v_k$ indicates the absence of diverse knowledge inside a knowledge network. We test curvilinear association by including *Network range squared*. For further discussion about this measure, see Burt (Burt 1992) or refer to the application provided by Reagans and Zuckerman (2001).

*Control variables* We used several control variables to capture the effects of other factors that are potentially important to explain projects' knowledge development, but not theoretically interesting in this specific study. We controlled for the amount of annual *budget* available for each project, as it is likely that the availability of resources would enable research teams to have broader access to technologies, external support, or other important resources ultimately important for knowledge development. This variable is expressed as the (natural logarithm) of the amount of the annual R&D budget expressed in Swedish Kronor. Since the size of projects might also affect the level of performance achieved at the project level, we controlled for the *dimension* by considering the number of scientists and/or corporate researchers affiliated with each project. Also, project *duration* may affect the level of performance achieved, and in the current study, we controlled for the number of months passed since the starting date of the project. A number of the behaviors and outcomes of the project are subject to variation on the basis of their type of ownership. In spite of those owned by private corporations, academic projects are more likely to be oriented toward streams and purposes that reflect those of open-end research (McKelvey et al. 2003). For this reason, we included a dummy variable labeled *Corporation* that equals 1 for projects pertaining to private corporations, and 0 for projects affiliated with academic organizations. Recent studies have shown that patenting can be hindered by the amount of scientific material that scientists publish in peer-reviewed journals or conference proceedings etc. (Blumenthal et al. 1996; Czarnitzki et al. 2009). For this reason, we finally controlled for the *Number of publications* achieved by researchers in each sampled project. Lastly, three control variables concerned the dimension and the general structure of projects' social capital. Since larger networks tend to be less cohesive and also less constrained (Burt 1992), we controlled for these possibilities by controlling for the number of other projects to which single projects are directly connected (*Degree*). The second variable included was the *Total Number of ties* calculated as the total number of inter-project relations connecting projects that compose the focal project's network, leaving out the ties that the latter has with all the others. Given two networks of the same size, composed of the same number of alters, the network with the highest number of ties is characterized by a greater level of interaction. A third, final measure takes into consideration *Network constraint*, along with its squared term, which indicates the general level of cohesion and redundancy characterizing the social capital of each project (Burt 1992). The inclusion of the squared term seems appropriate in light of the hypothesized U-shaped relationship regarding network diversity.

Table 7.1 summarizes our discussion by reporting the descriptive statistics of all the variables included in our empirical model specifications. Table 7.1 also reports the first-order correlation coefficients among all the relevant variables.

**Table 7.1** Descriptive statistics and correlation matrix for variables

| | | Mean | Std dev | Min | Max | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Budget (log) | 6.0111 | 0.0323 | 6 | 6,65 | 1 | | | | | | | | |
| 2 | Dimension | 0.1717 | 0.3777 | 6 | 25 | 0.0094 | 1 | | | | | | | |
| 3 | Duration | 0.4074 | 0.4921 | 11 | 34 | −0.2514 | 0.0222 | 1 | | | | | | |
| 4 | Corporation | 0.1717 | 0.2301 | 0 | 1 | 0.0257 | 0.1191 | −0.0397 | 1 | | | | | |
| 5 | # Publications | 11.9448 | 8.9694 | 1 | 37 | 0.1236 | 0.2337 | 0.1895 | −0.1301 | 1 | | | | |
| 6 | Degree | 8.2020 | 4.9714 | 0 | 33 | 0.0145 | 0.4096 | 0.1333 | 0.0769 | 0.1989 | 1 | | | |
| 7 | Number of ties | 42.1616 | 31.9721 | 0 | 98 | 0.3310 | 0.3901 | 0.2971 | 0.0019 | 0.1527 | 0.5421 | 1 | | |
| 8 | Network constraint | 0.3310 | 0.1927 | 0 | 1 | −0.0036 | −0.2386 | −0.2301 | −0.1203 | −0.0411 | −0.6964 | −0.2133 | 1 | |
| 9 | Network range | −0.0512 | 0.5956 | −1 | 1 | −0.1308 | −0.0553 | 0.1838 | −0.1062 | 0.0306 | 0.0082 | 0.1235 | −0.0133 | 1 |

## 7.4 Results and Analysis

We used negative binomial regression to estimate the effect that project social capital closure and range have on the number of patents (Long and Freese 2006). The results are displayed in Table 7.2.

Model 1 in Table 7.2 regresses the number of patents on the set of control variables. Overall, the inclusion of the control variables results in a model that is significantly different from a null model. All of the control variables are significant. As expected, surveyed projects

**Table 7.2** Negative binomial regression estimates (standard error in parentheses)

| | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| Constant | −0.8774*** (0.1642) | −0.3212 (0.3113) | −0.1236 (0.3246) |
| Budget | 1.9837*** (0.0838) | 1.8812*** (0.0791) | 1.8921*** (0.0863) |
| Dimension | 0.9494*** (0.0776) | 0.9075*** (0.0712) | 0.8788*** (0.0895) |
| Duration | 0.6589*** (0.0810) | 0.6012*** (0.0839) | 0.7148*** (0.0779) |
| Corporation | 0.5763*** (0.0597) | 0.5623*** (0.0599) | 0.5100*** (0.0509) |
| Number of Publications | −0.0314*** (0.0039) | −0.0316*** (0.0035) | −0.0291*** (0.0042) |
| Degree | | 0.0211 (0.0190) | 0.0206 (0.0194) |
| Total number of ties | | 0.0410** (0.0199) | 0.0512 (0.0272) |
| Network constraint | | | 2.4477*** (0.8444) |
| Network constraint squared | | | −3.1864*** (0.9856) |
| Network range | | | 0.4180*** (0.0910) |
| Network range squared | | | −0.2473*** (0.0497) |
| Number of Obs | 53 | 53 | 53 |
| Log-likelihood | −1068.9640 | −1060.5611 | −1036.9011 |
| Pseudo R squared | 0.3359 | 0.3401 | 0.3671 |

$^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

characterized by higher tenure and dimension are more likely to achieve higher levels of knowledge development. This makes sense since tenure indicates the previous experience developed at the project level, which in turn can influence the projects' patenting activity. Also, the dimension variable is positively and significantly associated with the number of patents. Even in this case, it is reasonable to expect that projects with many team members perform better, at least in terms of number of patents. The positive and significant coefficient for the variable "Corporation" indicates that the institutional profile of projects also matters for the levels of knowledge development achieved by projects in our sample. In particular, we can see that corporate projects are more likely to develop new knowledge than academic projects. Our findings also document that the coefficient for the variable "# Publications" is negative and significant, which indicates that the propensity to publish research results of a project is negatively associated with the levels of new knowledge developed at the project level. Although there is no general consensus about this in the extant literature, our results are in line with the evidence provided by recent studies in this field (Czarnitzki et al. 2009).

Compared to the variables of Model M1, Models M2 and M3 include measures characterizing the network structure of the project social capital. Model M2 includes the "Degree" and "Total number of ties." Whereas Degree was not significantly associated with the dependent variable, the positive coefficient for the Total Number of Ties highlights that a greater number of relationships between projects composing the project social capital corresponds to a higher level of knowledge development.

In Model 3, we include two variables that directly speak about the structure of projects' social capital, namely "Network constraint" and "Network range," along with their squared terms are labeled "Network constraint squared" and "Network range squared."

Model 3 in Table 7.2 shows that the coefficient for "Network constraint" is positive and significant, and the coefficient for "Network constraint squared" is negative and significant, suggesting an inverted U-shaped curvilinear relationship that maximizes the number of patents at moderate levels of network constraint. Results also document that the coefficient for "Network range" is positive and significant and the coefficient for "Network range squared" is negative and significant. These results support the hypothesized inverted U-shaped relationship between the range of project social capital and the number of patents achieved at the project level. This pattern of results implies that even though the creation of collaborative ties with other projects operating in different areas of expertise enriches the effectiveness of projects (Reagans and Zuckermann 2001), there are also costs for projects that seek other units to add and integrate new know-how to their knowledge stock (McFayden and Cannella 2004). As further collaborative ties which cut across areas of expertise boundaries are added, the costs of assimilating, absorbing, and combining diverse information eventually outweigh the benefits (Zahra and George 2002). Hence, the logical reasoning used by Bhidé (2000) regarding costs and benefits of diversity at the organizational level appears to be applicable also at the level of project networks.

## 7.5 Discussion and Conclusion

Drawing upon the recent literature in social capital, we used the construct of project social capital in order to investigate its influence on knowledge development in R&D projects in the biotech field. Our results suggest that certain structural configurations of project social capital maximize the level of effectiveness in knowledge development. More specifically, the empirical observations show that moderate levels of project diversity are correlated with higher knowledge development performance.

The level of diversity of project social capital relates to how different the partners involved in social exchanges are, taking into account the prevalence of cross-boundary social interactions between projects. Our findings show an inverted U-shaped relationship between projects' network diversity and their level of knowledge development, demonstrating that intermediate levels of diversity maximize project knowledge development.

The present study contributes to previous research in several ways. First, the empirical results underscore that project social capital is a useful concept to capture the embeddedness of projects and highlight the importance of external links for project knowledge development. With the exception of a few cases (Arthur et al. 2001; Grabher 2002a; Di Vincenzo and Mascia 2012), there is to our knowledge a lack of studies exploring analytically and with empirical data the interdependences between projects and the network of personal relationships built around projects (Grabher 2002a). In this study, we extend the existing literature on social capital examining how resources and knowledge are channeled through network relations that involve the project level. Project social capital adapts and extends the more established notions of social capital to the specific context in which PBOs operate and perform (Di Vincenzo and Mascia 2012), a setting which is characterized by a number of particularities that bring the importance of social capital to the foreground. Indeed, projects are formed by multiple members who are engaged in frequent communication with other individuals within and outside the project. In addition, projects often involve people working together on complex innovative tasks for a well-defined limited period of time. Finally, it is likely that projects will become highly embedded in a set of project-specific relationships in addition to those that their individual members develop.

The second point of this chapter is that it makes a contribution to the debate among scholars regarding what kind of network structure is the “best” for knowledge development. On the one hand, the theory on structural holes states that individuals who hold heterogeneous ties, connecting two or more otherwise disconnected actors, have more social capital than other individuals (Burt 1992), even though this theory does not specify whether these benefits can be realized under all conditions. On the other hand, a different approach to social capital instead recognizes the advantages of homogeneous social networks and strong ties, which (among other things) should result in a more effective exchange of knowledge (Obstfeld 2005). Our empirical findings support the view that, at least within a project-based context, the more effective network structure seems to be a combination of these two, seemingly incommensurable, structures. A possible explanation for a third way out of these conflicting ideas may be provided by the cognitive distance theory, and specifically by Noteboom et al. (2007), who state that “the challenge is to find a partner at a sufficient cognitive distance to tell something new, but not so distant as to preclude mutual understanding" (p. 1017). At first, as cognitive distance increases, it has a positive effect on knowledge development. When people with different knowledge and perspectives interact, they stimulate and help each other to stretch their knowledge for the purpose of bridging and connecting diverse knowledge. However, at a certain point, the cognitive distance becomes so large that it precludes the mutual understanding needed to utilize those opportunities.

Another plausible explanation concerns the disadvantages associated with highly closed and overly embedded networks. One important risk, especially in knowledge-intensive work, is that subjects may start to trust their group judgment more than information from the surrounding scientific world. Known as "group-think," group cohesion tends to generate mutually affirming effects that can reduce or restrict access to the more diverse resources and innovative information that might be available beyond the closed group (McCauley 1989). In particular, the resources and information that flow through external ties might be ignored or discounted when they enter a closed project, or more generally, the lack of information utilization might be due to the development of strong positive intra-project biases and negative extra-project biases that prejudice a project's members against absorbing and using information from outside their project (Oh et al. 2004 use similar arguments about groups). Furthermore, the findings corroborate some of the existing ideas on creativity in organizations (Milliken and Martins 1996) by indicating both the potential positive and the possible negative sides of diversity, pointing out the value of a balanced use of diversity in project portfolios and networks.

The findings of this study also have a number of direct implications for project management. One is that it highlights the need to regard projects as embedded entities, and that project managers should deliberately consider project network aspects in order to better leverage the resources available in project team members' formal and informal relationships, both inside a single project and between different projects. Consequently, there is a need to build and use relationships in a fruitful way, calling for the development of appropriate competences.

Moreover, we see that deliberately managing project social capital is largely about handling the paradox of simultaneously allowing moderate levels of project network diversity and project network constraint, two things that at first sight seem incommensurable. Even though these two dimensions of project social capital may somewhat counteract each other, the pragmatic managerial solution is to accommodate their coexistence by using a suitable set of integration mechanisms within and between projects, in order to create prerequisites in terms of levels of redundancy and absorptive capacity. By extending the view of the relevant system boundaries to include other projects and the relationships to them, managers can reveal opportunities to move beyond the earlier perceived trade-offs and thereby reach new levels of performance (Di Vincenzo and Mascia 2012). Arguably, an important contingency factor to consider in relation to the effects of project social capital is the extent to which projects aim at generating new knowledge through creative processes, and the extent to which they are vehicles for efficiently bringing together already existing knowledge.

The study has a number of limitations that invite further investigation. As with most network research, the design was cross-sectional, preventing determination of causality. Although we have argued that a project's configuration of social capital determines its level of knowledge development, future longitudinal research might be able to determine the direction of causality. Recent studies have documented that the analysis of the evolution of collaborative patterns is especially essential for better understanding of a number of relevant project-based outcomes such as learning and innovation (Manning and Sydow 2011). Longitudinal data would allow us to explore in depth the links between project social capital and knowledge development. Such data would also enable us to examine how different inter-project relationships emerge, evolve, or are abandoned, in accordance with a truly dynamic process (Guimerà et al. 2005). However, such longitudinal models face considerable challenges in terms of data collection, notably as far as network data are concerned.

Another limitation is that our analysis of the structural aspects of project social capital is limited to those collaborative relationships established by, and among, projects localized within the science park. We are aware that projects' relationships with actors localized in different contexts also play an important role for project behavior and performance. However, there is ample evidence about the importance that co-location has for research actors in highly uncertain and complex industries such as biotech R&D (Liebeskind et al. 1996). In this context, the rise of trustworthy, frequent, and reciprocal exchange of relevant resources, which is strictly related to the possibility to achieve important outcomes, dramatically depends upon the availability of potential partners in the immediate network around a project. A deeper understanding of how projects develop new knowledge in this field strongly relies on the way they build upon existing networks with other projects to generate and use resources, which is a fruitful avenue for future research.

A third limitation concerns the proxy we adopted for the measurement of knowledge development at the project level. Previous studies have indicated that, other than the number of patents granted, there are a multitude of project aspects that may be referred to as project knowledge outcomes—such as new grants achieved, new spin-off projects, development of models or approaches in the field (Cummings and Kiesler 2007). In addition, in this study, we focused on short-term outcomes in research collaboration, rather than the quality of a particular outcome or long-term outcomes. Notwithstanding this limitation, extant research has largely documented that patents granted can be considered a proxy of knowledge development at the project level in biotech R&D (Maurer and Ebers 2006). Future work would benefit greatly from exploring whether the hypothesized structural configurations of project social capital do play the same role for other project outcomes achieved in this industry.

A final limitation refers to a number of idiosyncrasies pertaining to the non-random choice of the research setting adopted in this study. As the specialized literature has recently theorized, project-based forms of organizing are not homogeneous: they differ in a number of important respects (Whitley 2004). The data employed in this study refer to only 53 projects in biotech R&D, leaving open the question of whether our results would generalize to a broader population of projects in different industries.

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# 8

# Professional Networks and the Adoption of Medical Technologies: An Empirical Study on Robotic Surgery

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## 8.1 Introduction

Successful implementation of new "hybrid" organizational forms, which are distant from the standard design rules, depends on the ability to govern the change management process (Jay 2013). The emergence of

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new roles and new tasks, increasingly and frequently required, may be in fact ineffective as far as the awareness and the compliant behaviors among users are lacking and the relative benefits remain unperceived (Quartz-Topp et al. 2016).

In the case of disruptive innovations, such changes are more likely to be complex and challenging and require many efforts from management and decision makers. The introduction of innovations may radically modify many aspects of the organizational design at macro, meso and micro level, such as the internal and external relations among actors in the system. As a result, innovation is at the same time a driver for change and a reason for failure.

Health care systems, to be intended as the complex of "all organizations, people and actions whose primary intent is to promote, restore or maintain health" (WHO 2007), are competitive. Providers have increasingly integrated institutional logics, associated to the concept of health as an individual right, with quasi-market elements, aimed at ensuring the freedom of choice for citizens in the provision of services they need (Ferrè et al. 2014). This trend is observable also in public, universalistic systems, such as the Italian National Health Care Service (I-NHS). Such change fostered increasing competition among health care organizations. On this ground, technology plays a dramatic role and new organizational adaptations to the new technological solutions are made available in a number of health care pathways.

Nevertheless, previous evidence (Mascia et al. 2014a) have shown that the adaptation to these changes is far from being effective in Italy. This criticism may finally result in a noncompliant use of new technologies introduced. Indeed, examples of underutilization or total abandonment of technologies in the clinical practice are not rare in our system, even when large financial efforts have been made to implement them. The reasons for this failure are several, but most reside in the substantial difficulties in modifying institutional and cultural logics that need to be reconsidered in every organizational project, which should take into account the presence of cultural and social barriers of professional communities. However, even if professionals may represent an obstacle to the effectiveness of technological change, they should be acknowledged as the main driver of technological acceleration at the same time.

Our study thus aims to focus on the individual determinants of an organizational change in terms of adoption and use of a new technology, presenting an empirical research conducted within the I-NHS on a highly debated case study, the Da Vinci Surgical System. The reasons for the choice of this technology as exemplar are found in its specific characteristics and in the adoption process observed in the Italian context. Previous studies discussed the extent to which early experiences with the technology affect subsequent later adoptions and how social determinants encourage the initial use of the technology, finally supporting its diffusion even under conditions of uncertainty (Compagni et al. 2015). Moreover, existing literature shows how beliefs and values of adopters are strong antecedents for its use (Iacopino et al. 2016). Robotic technology requires an important organizational commitment and a significant integration effort to effectively manage its implementation and optimal use in the clinical practice. Moreover, patients' demand for its use has increased over time, making the robotic surgical procedure as preferred in some clinical conditions. Finally, the variety and heterogeneity of scientific evidence supporting its use have made the robot a highly debated topic in the scientific arena.

The objective of the study is to understand the role of informational sources in the temporal choice of adoption of the technology by the Italian adopters. Particularly, we investigate the role of explicit evidence, namely, the guidelines, as a determinant of temporal choices of the adoption. Contextually, we aim to appreciate the role of mindlines, namely the social and tacit knowledge surrounding the use of an innovation, measured by the interaction of professionals and their advice network.

## 8.2 Theoretical Background

Hybrids organizations are characterized by new options for design and management of modern health care contexts. Increasingly, the vision and the normative actions addressing these organizations require large and complex efforts to integrate competencies, knowledge, values, and behaviors. Nevertheless, such efforts are effective only when a conscious interpretation and the acceptance of new practices and tools in the implementation occur among clinical practice, finally conducting to the emergence of new roles and new knowledge sharing tools (Quartz-Topp et al. 2016).

Such an objective is not easy to achieve per se and it is critical in the case of hospital organizations, because of the contextual presence of social barriers defining profoundly diverse professional identities (Ferlie et al. 2005). Knowledge sharing and management practices are strategic aspects to ensure the quality of care and thus are critical to these organizations (Dandi et al. 2013).

Moreover, it is necessary to further consider that knowledge generation in health care is an increasingly complex issue (Yang et al. 2007), especially because of the occurrence of disruptive innovations often implying extraordinary revolution. First, the variety and heterogeneity of sources supporting clinical evidence imply the traditional problem of classification, grading, and generalizability of clinical results. Second, the availability of evidence, which profoundly varies as the knowledge diffuses, stimulates continuous and new managerial questions.

Health technologies, including drugs, medical devices, medical equipment, and the organizational arrangement addressing their usage, are thus affected by this complexity. Consequently, also the choices taken by users to adopt them and therefore their diffusion often result in nonlinear, ambiguous patterns (Denis et al. 2002). As a consequence, examples of overutilization or, rather, underutilization of a certain technology are not isolated in this sector, even when the system of knowledge supporting its use is available and accessible. In the case of very innovative technology, such ambiguity is very frequent.

However, the availability of evidence is not the unique determinant in defining the acceptance of the technology among adopters and the entire ensemble of judgments and values that users express about (Iacopino et al. 2016). Together with the quality and accessibility of such explicit knowledge, organizational factors, strategies, institutional and managerial background, and intrinsic characteristics of the technology itself are recognized as factors influencing these choices (Rye and Kimberly 2007). Especially in the case of nonlinear, messy patterns, it is hard to understand how technologies diffuse and which is the relative role assigned to the different types of knowledge in the choice of adoption. In the health care ground, such ambiguity is more likely to be found in regard to medical devices and medical equipment, where a higher level of endogeneity in the adoption choices is recognized, given the lack of a strong regulation. For these technologies, the choice of adoption is mainly taken at local level, by the hospital top or middle management, according to organizational requirements and clinical inputs, it is also "socially determined" (Krackhardt 1997, p. 177).

In an ethnographic study conducted on primary care clinicians, Gabbay and Le May (2004) highlighted that clinicians rarely access to explicit evidence, namely, the guidelines, directly, but rather the access to such system of knowledge is mediated by mindlines, that they define as "collectively reinforced, internalised, tacit guidelines" (p. 1). The natural locus for such exchange resides in the continuous contact with colleagues, opinion leaders, and further actors in the system, such as patients and company representatives. This mediation results, finally, in "socially constructed" knowledge (Gabbay and Le May 2004, p. 1). Clearly, professional networks emerge as preferred channel for knowledge generation and exchange, especially within the diverse communities of practices, which are exemplar in the case of clinicians, all characterized by high level of professional identities, more than organizational (Mascia et al. 2015).

Networks are thus natural environments in which actors exchange clinical advice, knowledge, and opinions (Mascia et al. 2014b; Dandi et al. 2013; Mascia and Cicchetti 2011; Dopson et al. 2002) and in which relationships among professionals are created. Thus, the role they play in the adoption of innovation has been largely recognized. The continuous interaction among individuals, encouraging or limiting the choice of adoption (Coleman et al. 1957; Ferlie et al. 2005), affect the level of communication and their likelihood to act in a knowledge exchange process. In the health-care sector, a number of studies have described the role of professional networks in the adoption of organizational innovations (Anderson and Jay 1985), primary care practice behaviors (Fattore et al. 2009), knowledge sharing, and learning process (Fitzgerald et al. 2002). Moreover, evidence showed the correlation between physicians' level of adoption and their localization in a certain network (Anderson and Jay 1985). Still, a scant amount of knowledge is found on how professional factors and network predictors influence the adoption of medical technologies. More specifically, although the relative role of these different set of informational sources in the overall system of knowledge generation and exchange seems to exist in different setting (e.g., Monti and Soda 2014), exhaustive knowledge is not available in the context of health care regarding the patterns of technology adoption. This research has been conducted in order to cover this research gap. Scientific debate on the adoption of innovation in health care stimulated us to propose a new emerging research question addressing the elaboration of this exploratory study, which aims to understand the role of informational determinants, both mindlines and guidelines, in thetemporal choice of adoption of the technology by the Italian adopters. Specifically, we focused our efforts on the case of a very innovative and debated technology, namely the Da Vinci surgical system, a minimally invasive surgical equipment highly diffused among the Italian health care organizations. We shift the focus from the classical perspective of the diffusion of innovation literature to the question of the determinants of individuals' similarity in the temporal choice of adoption. Two set of informational determinants are discussed, namely the individuals' similarity in their informal pattern of relationship and their access to EBM knowledge about the new technology. These two questions have never been discussed previously in this context.

## 8.3 Research Design

### 8.3.1 Setting

This study has been placed in the context of the Italian National Health Care Service (I-NHS), which was created with National Law in 1978 to establish a regionally based system of health care providing universal coverage to the population. All the decision-making levels, namely the national, regional, and local, are responsible for the provision of health care services through providers, such as public hospitals, accredited facilities, and Local Health Authorities (LHAs). Frequently subjected to many institutional reforms, emerging trends in the '90s conducted the I-NHS to the development of new forms of competition between public and private providers, in order to introduce quasi-market elements in the health care context. Moreover, the progressive decentralization of responsibilities invested regions of relevant organizational and financial duties (Ferrè et al. 2014). With the exception of drugs, the choice of adoption of health technologies, specifically in the case of medical devices and medical equipment, are still locally based and mostly managed under the stimuli of potential adopters and in accordance to budget constraints every provider must consider.

The choice of the Da Vinci Surgical System as a case study for this research appeared particularly interesting to us. In fact, we recognized in the technology—mainly used in general surgery, urology, and gynecology—a highly innovative equipment with a high rate of unexplored potentialities and a number of economic and organizational implications that may be taken into consideration in the adoption process.

### 8.3.2 Data and Sample

This study has been conducted using data collected from different sources of information. First, the collaboration in the Research Project funded by the Italian National Agency for Regional Health Services (Agenas) and entitled "Tools and methods to regulate the processes of technological, clinical and organizational innovation in the NHS. An integrated system of research" (www.agenas.it) allowed researcher to submit a sociometric questionnaire (Wassermann and Faust 1994) to a selected sample of surgeons. This questionnaire was made up of thirteen questions and five different main sections. In the first section, surgeons' attributional characteristics were collected. In the second section, information about context and time of first use of the technology, as well as the sources of knowledge through which professionals noticed for the first time about its features, was reported. In the third and fourth sections, information about the current use of the Da Vinci was required, while in the last section, we collected data on the information exchange network relationships. In particular, we asked respondents to mention colleagues both within and outside their hospital with whom he or she usually kept advice relationships about the use of the technology. After a preliminary validation by experienced surgeons practicing in the I-NHS, the questionnaire was submitted to the adopters, together with a short presentation of the research project and completed with the support of the research team, when necessary.

We finally completed our dataset with additional information on surgeons by collecting their curriculum vitae publicly available on the web. After the administration period, 28surgeons provided completed answers to the questionnaire.

## 8.3.3 Measures

In the following section, we turn on the detailed description of the measure used in the study. We present our operationalization according to the general intuition of confronting two alternative set of explanations for the interpersonal similarity in the adoption of the technology (i.e., our dependent variable). The intuition is based on the idea that individuals can either rely more on formal and therefore *evidence based* information or on more informal sources of information representing "*internalized, collectively reinforced tacit guidelines* or *mindlines*" (i.e., Gabbay and Lee May 2004, p. 1) derived by their being embedded in networks of community of practices.

**Dependent variable**

**Similarity in the timing of technology adoption.** Similarity in the technology adoption is the extent to which the doctors' tenure in the use of the technology is similar to those of each of her/his network ties. That measure was created as illustrated below. We use respondents' tenure in the use of the technology expressed in months. The tenure goes from 6 months up to approximately 10 years of utilization by the most experienced respondent surgeon (mean: 42 months; std dev: 32 months). We then computed the degree of dissimilarity by taking the absolute difference between person *i*'s and person *j*'s on this specific item. For example, if person *i* had a tenure of 24 months and person *j* of 44, then cell entry X*ij* would be 20 for that particular pair in the dissimilarity matrix. In other words, small numbers represented greater interpersonal similarity in the degree of adoption of the technology with each possible target. Finally, we used the same procedure, unless otherwise specified, to compute dissimilarity matrix for the following measures.

### Evidence-Based Drivers

**Similarity in the official documentation and evidence about technology.** This measure represents the extent to which respondents use the same official sources of information to gain knowledge useful for deciding to adopt or not a new technology (Gabbay and Lee May 2004). In particular, we asked to the respondents to indicate the source through which they became aware for the first time about the technology and its usage. Respondents had the possibility to check as many different sources as they wanted. For this specific measure, we calculated the number of same sources each individual shares with one another. We proceeded by first creating as many as dissimilar matrix corresponding to the possible set of choices each individual had. Since the choices were dichotomous, we used the product rule to create a matrix in which X*ij* = 1 if both person *i*'s and person *j*'s selected the same sources and 0 otherwise. Second, we sum up all the matrix corresponding to sources related to the use of manual/text book, scientific articles, guidelines/EBM, hospital or regional district official documents, and scientific societies report. Therefore, we obtained an index that ranges from 0 up to 7. The greater the number, the greater the interpersonal similarity in their reliance of official sources between two individuals.

**Similarity in training.** Here, we distinguished between *formal mandatory training* provided by individual's hospital and *formal optional training* based on individual willingness to know and be updated about new technologies. We created for these two different items a dissimilarity matrix using a product rule in which X*ij* = 1 if both person *i*'s and person *j*'s selected the same sources and 0 otherwise.

## Mindlines

**Scientific and professional network community.** This measure represents the extent to which respondents use both other colleagues and external professionals, such as biomedical engineers and biomedical companies, to collect information about the technology. Again, we proceeded by first creating as many as dissimilar matrix corresponding to the possible set of choices each individual had. Since the choices were dichotomous, we used the product rule to create a matrix in which $Xij = 1$ if both person *i*'s and person *j*'s selected the same sources and 0 otherwise. Second, we sum up all the matrix corresponding to the mentioned source to obtain an index that goes from 0 to 4. The greater the number, the greater the interpersonal similarity in the reliance on scientific and professional communities between two individuals.

**Advice Network.** This variable was built by asking surgeons to mention colleagues both in and outside their own hospital with whom they usually seek advice relationships about the robot. Then, an adjacency matrix indicated such relations was produced. The matrix reported both in the rows and columns the names of the surgeons and in the cells the value of "1" whether they interact and the value of "0" otherwise. We then transformed this adjacency matrix in a one mode matrix to account for the size of each respondent's network. A second matrix reporting a measure of centrality degree was derived and enrolled in our model. Similar to the abovementioned procedure, this last counts the absolute differences in the each pair individual degree centrality.

## Control Variables

Homophily literature (for a review see; McPershon et al. 2001) offers evidence of the influence of sociodemographic dimensions like race, ethnicity, sex, or age, and of acquired characteristics like religion, education, occupation on attitudes' interpersonal similarity. In order to rule out possible alternative explanations, we controlled for age, doctors' specialization, hospital's influence, and respondents' similarity in their numbers of scientific subscriptions. Moreover, recent development in relational demography researches confirmed the potential impact of variables such age, functional, and tenure similarity on beliefs that are as determinants of social influence process (Chattopadhyay et al. 1999). Thus, we controlled for the age because it could be considered as an indication that individuals have encountered similar life experiences that in turn may lead to similar knowledge and cognitive structure that will in turn influence both the possibility to interact to each other and their similarity in the adoption. Therefore, greater age similarity could increase the influence of one another's belief and thus the likelihood of the similar pattern in the adoption of the technology. Finally, we operationalized age as the number of years of the respondents. In the same line of reasoning, we considered the doctor's specialization and number of scientific subscriptions. The number of scientific subscriptions were also included to account for the possibility the similarity in the adoption of the technology could have driven by the similar exposition to unobserved source of knowledge other than the one explicitly requested in the questionnaire. Finally, we controlled for the effected of pressure from the local hospital management in adopting the technology. In this case, similarity in the adoption of the technology could have been driven by the perceived pressure from the management of the hospital rather than our hypothesized set of informational drivers.

Hence, we converted such individual valued attributes in similarity matrices based upon two routines according to the nature of each variable (continuous vs categorical). Control measures for age, hospital' influence and number of scientific subscriptions were continuous; thus, the matrices contained difference scores between two actors on each variable. For example, cell entry X*ij* for the age matrix represented the absolute value of actor *i*'s age minus actor *j*'s age. If actor *i* had been 52 years old at the moment of the survey and actor *j* had been 57, cell entry Xij would equal 5. The scientific subscriptions matrix was similar, with cell entries equaling the absolute value of differences in the number of subscriptions between two actors. Finally, a 5-point scale was used to record responses about individual perception of hospital pressure for adopting the new technology. The scale was anchored by "not at all" and "very much," with "moderately" in the middle. We computed the degree of dissimilarity by taking the absolute difference between persons *i*'s and person *j*'s fulfillment response on this item. For example, if person *i* rated its perception of hospital's influence at 5 and person *j* at 2, then cell entry X*ij* would be 3 for that particular pair in the dissimilarity matrix. Similarity matrix for the categorical variable doctor's specialization was obtained using the matching rule (Borgatti et al. 2002). For example, cell entry X*ij* in the doctor's specialization matrix was coded zero if actors *i* and *j* had different professional specialization and one otherwise.

### 8.3.4 Analytic Strategy and Results

**Analyses**

Because the level of the analysis in this study is the dyad and the observations in network data are not independent, the error terms within rows and columns in a matrix are auto-correlated to each other, it is not appropriate to use standard statistical models such as Ordinary Least Square Regression or Structural Equation Modeling. To explore the role of both evidence-based and mindlines explanations in affecting individuals' degree of similarity in the adoption of a new technology, we conducted a Multiple Regression Quadratic Assignment Procedure (MR-QAP) analysis. QAP resolves the abovementioned problem (Krackhardt 1988) by regressing each of the dependent matrices against the independent variable and control matrices using a two step procedure. In the first step, the algorithm performs a standard multiple regression across corresponding cells of the dependent and independent matrices. Second, the rows and columns of the dependent matrix are randomly permutated and the regression is recomputed. This step is repeated ten thousands of times, and the procedure then counts the proportion of random permutations required to yield the regression coefficient found in step one (Borgatti et al. 2002). A significant relationship is indicated if a low proportion ($p < 0.05$) of similar results is found in step 2 when compared with step 1. Finally, as is standard in network research we removed missing data from both QAP correlation and regression analyses.

## 8.4 Results

At the end of the administration, 28 surgeons provided completed answers to the questionnaire. The whole sample was made up of 27 men and only 1 woman (mean age: 54 years old; std. dev.: 10 years).

The professional network of physicians based on their advice choices is displayed in Figs. 8.1 and 8.2. In Fig. 8.1, red dots represent the respondents, while purples dots represent shared or not shared sources of information. Figure 8.2 displays the inter-physician one mode Advice Network based on advice choices. Isolates are reported on the left.

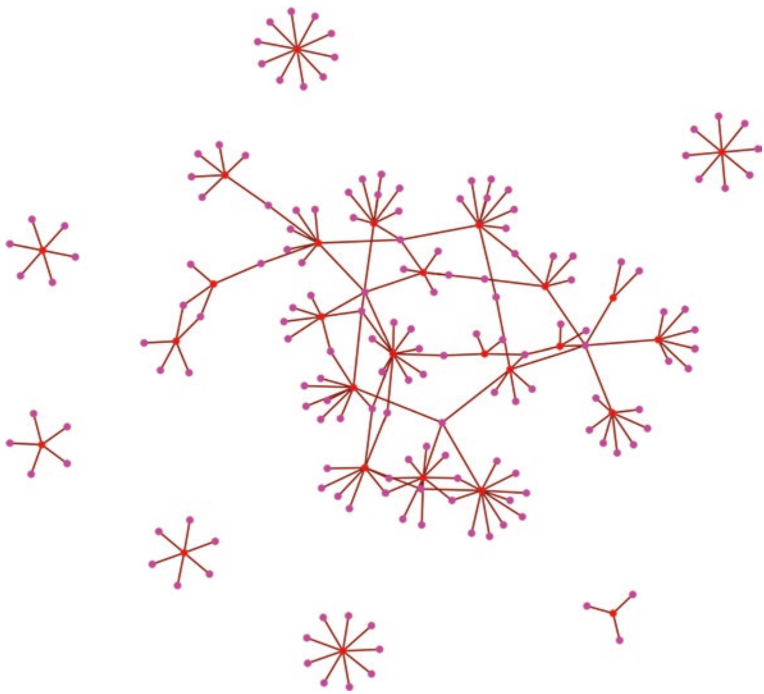
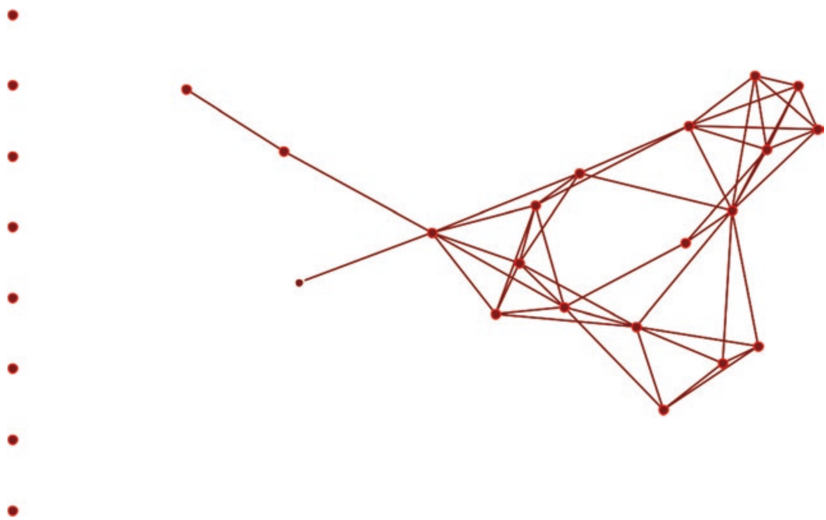


**Fig. 8.1** Inter-physician bi-partite advice network based on their advice choices. (Adapted from Kathleen M. Carley, 2014, ORA: A toolkit for dynamic network analysis and visualization, In Reda Alhajj and Jon Rokne (Eds.) Encyclopedia of social network analysis and mining, Springer.) *Note Red dots* represent the respondents while *purples dots* represent shared or not shared sources of information



**N =28; Isolates aligned on the left**

Fig. 8.2 Inter-physician one mode Advice Network based on their advice choices

Table 8.1 provides the means, standard deviations, reliabilities, and intercorrelations for all variables. While descriptive statistics were calculated on the variables, intercorrelations were calculated using QAP correlation for the independent and dependent variables. Different to standard Person correlation QAP measure the extent to which two matrices overlap, or the similarity that exists between the variables. These correlations revealed that a number of the social networks matrices were significantly related, but none of the correlations were high enough to suggest that multicollinearity existed.

The results of MR-QAP analysis for our intuitions on interpersonal similarities of individuals' tenure in the adoption of a new technology are presented in Table 8.2. Finally, consistent with the construction of the dissimilarity matrices negative sign (–) for the coefficients indicate greater interpersonal similarity for the predicted variable, positive sign (+) otherwise. Goodness of fit is represented by the equivalent adjusted r-square and its significance.

**Table 8.1** Means, standard deviations, and correlations of network variable

| | Mean | St. Dev | Min | Max | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Technology adoption | 41.89 | 32.05 | 6 | 119 | 1 | | | | | | | | | | |
| 2. Scientific subscription | 5.40 | 2.84 | 1 | 10 | −0.079 | 1 | | | | | | | | | |
| 3. Age | 53.72 | 10.23 | 34 | 72 | −0.088 | 0.005 | 1 | | | | | | | | |
| 4. Hospital's influence | 2.88 | 1.51 | 1 | 5 | 0.035 | 0.060 | −0.033 | 1 | | | | | | | |
| 5. Documents | 1.39 | 0.41 | 0 | 5 | *−0.230* | 0.098 | **0.262** | −0.030 | 1 | | | | | | |
| 6. Scientific and professional network community | 1.05 | 0.37 | 0 | 4 | −0.149 | 0.106 | *0.159* | **−0.137** | **0.316** | 1 | | | | | |
| 7.Specialization | NA | NA | 1 | 13 | *−0.176* | **0.120** | 0.041 | −0.041 | *0.181* | **0.197** | 1 | | | | |
| 8. Advice network | 0.13 | 0.11 | 0 | 1 | −0.013 | **0.119** | 0.009 | 0.007 | −0.054 | −0.001 | **0.276** | 1 | | | |
| 9. Advice network degree centrality | 0.17 | 0.11 | 0 | 1 | −0.064 | **−0.107** | −0.047 | *−0.075* | 0.034 | 0.064 | −0.062 | **−0.193** | 1 | | |
| 10. Formal mandatory training | 0.21 | 0.42 | 0 | 1 | 0.102 | −0.014 | **0.139** | −0.031 | **0.318** | **0.317** | −0.027 | 0.001 | 0.030 | 1 | |
| 11. Formal optional training | 0.71 | 0.46 | 0 | 1 | 0.155 | 0.129 | 0.144 | 0.092 | **0.316** | 0.056 | 0.019 | −0.033 | 0.015 | *0.202* | 1 |

*Note*. bold numbers mean that the correlation is significant at $p<0.05$ while italicized numbers correspond at $p<0.10$

**Table 8.2** MQAP regression analyses of tenure similarity in technology adoption

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | *Std beta* | *Std error* | *Std beta* | *Std error* | *Std beta* | *Std error* |
| *Controls* | | | | | | |
| Scientific subscriptions | −0.04819 | 0.97445 | −0.05214 | 0.89839 | −0.05762 | 0.88478 |
| Age | −0.11918 | 0.32561 | −0.06005 | 0.27748 | −0.06666 | 0.28696 |
| Hospital's influence | −0.00557 | 1.58127 | −0.01214 | 1.45728 | −0.01855 | 1.41876 |
| Specialization | −0.1477 | 6.29264 | −0.09527 | 5.64086 | −0.10008 | 5.96362 |
| *Evidence-based* | | | | | | |
| Documents | | | −0.35366* | 4.26549 | −0.34627** | 4.78232 |
| Formal mandatory training | | | 0.11343 | 12.68027 | 0.11384 | 12.40586 |
| Formal optional training | | | 0.14911 | 7.76577 | 0.15619 | 8.09307 |
| *Mindlines* | | | | | | |
| Scientific and professional network community | | | | | −0.00231 | 4.82717 |
| Advice network | | | | | 0.02120 | 6.92625 |
| Advice network degree centrality | | | | | −0.06267 | 0.91158 |
| Intercept | 0.00000*** | 0.00000 | 0.00000*** | 0.00000 | 0.00000*** | 0.00000 |
| *Adj R-Sqr* | 0.033** | | 0.134** | | 0.134** | |

*$p$<0.05; **$p$<0.01; ***$p$<0.001, Multiple Regression Quadratic Assignment Procedure Results. Number of observations = 506. Number of permutation = 10000. Standardized regression coefficients are displayed. Coefficient signs indicate greater (−) or lesser (+) interpersonal similarity in technology adoption's tenure

Looking at the Model 1 (Table 8.2), it is possible to note that none of the control variables exerted an effect on our dependent variable. In Model 2, we tried to assess the validity of an evidence-based explanation for the similarity in the timing of the technology adoption between individuals. The results show a significant and positive effect of the extent to which two individuals used the same sources of formal documents and information to discover for the first time about the technology on their subsequent adoption. The greater the number of same sources used the smaller the distance in terms of months in the adoption of the new technology. Finally, the inclusion of these set of new variables significantly increased the explanatory power of the model from 0.033 to 0.134. The full model (Model 3) account for the explanation of the importance of the use of informal network of sources derived by individual's embeddedness in a community of practice. We did not find support for this last explanation and a significant difference in terms of variance explained by the model. Overall, we confirmed the importance of sharing same formal sources of information above and beyond individual's informal network in affecting the similarity in the timing of the technology adoption between two individuals.

## 8.5 Discussion

This chapter presents and discusses retrospectively the pattern of the Da Vinci Surgical System in the I-NHS. Particularly, the study is aimed at understanding the role of informational determinants, namely the mindlines and the guidelines, in the temporal choice of adoption. The administration of a semi-structured questionnaire allowed us to collect information about the use of the technology, the advice networks of professionals and the sources of information accessed to appreciate the final choice of adoption. Multiple regression quadratic assignment procedures (MR-QAP) tested the statistical association among the temporal difference in the adoption of the surgical system and the similarity in the access to the different sources. Our results display a significant and positive effect of the use of EBM documents and formal information on the temporal choice of adoption.

Our research has a number of implications, both theoretical and practical.

First, our study shifts the focus from the classical issue of earlier or later adopter in the diffusion of innovation literature to the question of the determinants in the similarity of temporal choices. Assuming this perspective, we compare two set of informational determinants both related to individuals' similarity in their informal pattern of relationships and their knowledge base about the new technology. These two questions have never been discussed previously in this context (see for an example in the managerial literature; Ho and Levesque 2005; Monti 2015). From a theoretical point of view, our results also suggest the need to jointly assess the potential effect of both individual attitudes and social network explanations in order to have a fuller explanation of an individual's behaviors (e.g., Monti and Bergami 2014; Monti and Soda 2014).

Second, our results present some highlights useful for decision-making. The use of Evidence-Based Medicine in health care context progressively increased over time. Previous research documented the antecedents of networks in the frequency of EBM use (Mascia et al. 2014b; Mascia and Cicchetti 2011) as well as the role of professional relationships in EBM prescriptive behaviors (Fattore et al. 2009). Although extensive research on I-NHS is already available in the management literature on this topic, they are mostly referred to the primary care contexts. Rather, we shift the focus of EBM use in the hospital intensive context and assumed the usage of guidelines as comparative to other informational pressures, such as the advice networks of professionals. Our results highlight the preferred use of EBM by physicians in the choice of adoption of the surgical system, suggesting that EBM is used at hospital level as the preferred tool to address the use of highly innovative technologies. Considering the high level of uncertainty characterizing the application of the Da Vinci, especially at the early stage of diffusion, such result seems to coherently interpret its pattern of adoption as well as the perception of users toward the technology.

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# Part III

## Adapting Innovation and Learning to Strategic and Organizational Change

# 9

# Between Sponge and Titanium: Designing Micro and Macro Features for the Resilient Organization

Luca Giustiniano and Franca Cantoni

## 9.1 Introduction

Uncertainty seems to characterize extant organizations forced to struggle with various types of risks and exposed to extreme external discontinuity (Kaplan and Mikes 2012). Managers have to deal with emerging misfits when traditional organizational structures do not hold properly (Donaldson and Joffe 2014) and conventional strategic behaviors are timeworn. Accordingly, organizations are asked to identify, design, and implement resilient structures and behaviors able not only to effectively and promptly face uncertainty but also to prevent and anticipate it. To say it with (Välikangas and Romme 2013), organizations are asked to "develop [those] mechanisms

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before the organization needs to recover" (p. 44). Indeed, resilience refers to the ability of an organization to continue to meet its core functions by finding and implementing in a fast and timely manner organizational micro- and macrostructure able to transform uncertainty into new solutions. While the progressive turbulence of the external environment requires organizations to be more resilient, the design of organizational resilience appears to be still limited to its adaptability to the external environment.

Despite the vast number of contributions discussing resilience in management (e.g., Weick 1993; Collins and Porras 1994; Weick and Sutcliffe 2001; Coutu 2002; Sutcliffe and Vogus 2003; Folke 2006; Cunha and Cunha 2006; Lengnick-Hall et al. 2011; Reinmoeller and van Baardwijk 2005; Välikangas and Romme 2013; Van der Vegt et al. 2015) and the proposals of several research agendas on the subject (e.g., Vogus and Sutcliffe 2007), an inwardly consistent proposal for designing the resilient organization is still missing. Aiming at filling such a gap, this chapter is structured in five parts. As resilience encompasses both recoverability (the capacity for speedy recovery after a crisis) and strength with solidity (the capacity to stay strong), the metaphorical sponge and titanium effects are explained in Sect. 1. In Sect. 2, we provide some indications for contextualized macro and micro configurations to tackle the external uncertainty and equivocality. As organizational resilience depends on the ability to restore efficacy and not merely or exclusively on the efficient use of resources, Sect. 3 presents the constitutive features of organizational design for resilience as structural (S), behavioral (B), and cognitive (C). Section 4 is devoted to discussions and conclusion, while the work ends with Sect. 5 where future research trajectories are depicted.

## 9.2 Sponge and Titanium: The Absorbent and Stiff Capacity of Resilient Organizations

In turbulent, surprising, and continuously evolving environments, crisis and discontinuity characterize extant organizations who are forced to struggle with various types of risks (Kaplan and Mikes 2012):

preventable risks such as breakdowns in processes and human errors; strategic risks undertaken voluntarily after weighing them against the potential rewards; and external risks which are beyond one's capacity to influence or control, are scarcely predictable as well as their potential impact, and little knowledge is available on how to handle them. Moreover, since globalization forces organizations to be overexposed to multiple stresses coming from different and heterogeneous environments, they need to develop resilience meant as the capacity to anticipate, respond, and rapidly recover from a disruptive event (Vogus and Sutcliffe 2007). As a consequence, only flexible, agile, and dynamic organizations can thrive. In that, resilient organizations differ from the other ones by their ability to tackle the external uncertainty and equivocality (Mayrhofer et al. 2007) by being "potentially ready" for the unexpected to occur (Weick and Sutcliffe 2007). Resilient organizations develop the capacity to cope with a wide array of anomalies and are constantly striving to grow their capabilities to do so, through learning from events and near events.

Although researchers working on the theme use different terms to describe different aspects of organizational resilience (Collins and Porras 1994; Freeman et al. 2004; Sutcliffe and Vogus 2003; Weick 1993), they all orient their analysis on some common features, that is the ability to find new solutions, effectively communicate, and reorganize in response to crisis (Kendra and Wachtendorf 2003). The working definition of a resilient organization is, therefore, one that has the capability to change with minor frictions by absorbing the negative effects generated by sudden shocks and recover to a new and better equilibrium while preserving the continuity of its operations. Consistently with the mechanical origin of resilience (Campbell 2008):

- Resilience is the ability of a material to absorb energy when it is deformed elastically, and release that energy upon unloading;
- The proof of resilience is the maximum energy that can be absorbed within the elastic limit, without creating a permanent distortion;
- The modulus of resilience is the maximum energy that can be absorbed per unit volume without creating a permanent distortion.

When it comes to organization design, resilience encompasses two elements: (1) recoverability, meant as the capacity for speedy recovery after a crisis—we refer to this as the "sponge effect" (Sponge: "a very light soft substance with lots of little holes in it…" Collins Dictionary); (2) strength with solidity, the capacity to stay strong—we refer to this as the "titanium effect" (Titanium: "… a strong malleable white metallic element, which is very corrosion-resistant and occurs in rutile and ilmenite"). Piggybacking on such metaphors, a resilient organization stays productive also during turbulences and difficulties as it is able to learn from experiences and mistakes and to look forward with a renewed push. This forward-looking and self-correcting type of organization anticipates changes routinely and addresses them proactively by activating multiple learning processes every time something negative occurs. The resilient organization distinguishes itself in its response, which is immediate, thorough, and constructive.

## 9.3 Design Features for the Resilient Organization

Nowadays, organizations are exposed to increasingly complex and equivocal external environments (Burton and Obel 2004) characterized by hypercompetition and rapid change. From an organizational design standpoint, resilience results from the processes and dynamics that are able to create or retain resources in a form that is sufficiently flexible, convertible, and malleable to enable organizations to successfully cope with and learn from the unexpected (Sutcliffe and Vogus 2003). In that, resilient organizations are constantly in search of contextualized macro and micro configurations to tackle the external uncertainty and equivocality (Mayrhofer et al. 2007), considering that they have to be potentially ready:

– for the unexpected to occur (Weick and Sutcliffe 2001);
– to cope with a wide array of anomalies (Vogus and Sutcliffe 2007);

and are constantly striving to grow their capabilities to do so, through learning from events and near events.

In this sense, the capacity for resilience is developed by ensuring a constant alignment between the macro organizational structure and assets (Par. 9.1) and HRs strategic management (Lengnick-Hall et al. 2011) (Par. 9.2).

### 9.3.1 Macro Organizational Structure and Assets

Although researchers working on the theme use different terms to describe different aspects of organizational resilience, they all orient their analysis on some common features, that is the ability to find new solutions, effectively communicate, and reorganize in response to crisis (Kendra and Wachtendorf 2003).

Mallak (1998) defines resilience as the ability to plan and implement adaptive positive behaviors according to the specific situation. Bell (2002) identifies it as the ability to promptly and adequately answer to unexpected changes. In both cases, resilience matches the ability to recover and bypass difficulties in a prompt way with resolution and precision.

From a structural design standpoint, the working definition of a resilient organization is, therefore, one that has the capability to (1) change with minor frictions when changing contexts by demonstrating flexibility and plasticity, (2) withstand sudden shocks, and (3) recover to a desired equilibrium either the previous one or a new one, while preserving the continuity of its operations.

The three elements in this definition encompass both:

- recoverability (the capacity for speedy recovery after a crisis), and
- adaptability (timely adaptation in response to a changing environment).

A resilient organization stays productive, efficient, and effective also during turbulences and difficulties as it is able to learn from experiences and mistakes and to look forward with energy, trust, and renewed push, and positively overcome new challenges.

Resilience, as considered in this work, is a multifaceted construct, mainly composed of three characteristics (robustness, redundancy, resourcefulness) and two possible performances (response and recovery).

In particular, these two last components describe how a system performs in the event of crisis.

Response refers to the ability to mobilize quickly in the face of crises and requires both communication and inclusive participation. Indeed, effective communication and trust in the information conveyed increased likelihood that, in the event of a crisis, stakeholders are able to disseminate and share information quickly, and to ensure cooperation and quick response from the audience.

Recovery, that has to be guaranteed for "each subsystem" of the "whole organizational system," is the ability to regain a degree of normality after a crisis including the ability of a system to be flexible and adaptable and to evolve to deal with the new or changed circumstances after the manifestation of a risk. It requires both active horizon scanning and responsive regulatory feedback mechanism.

- Active "horizon scanning": Critical to the attribute are multi-stakeholder processes tasked with uncovering gaps in existing knowledge and commissioning research to fill those gaps.
- Responsive regulatory feedback mechanisms: Systems to translate new information from horizon-scanning activities into action—for example, defining "automatic policy adjustments triggers"—can clarify circumstances in which policies must be reassessed.

Resilience is also made of three main characteristics or features: robustness, that is the ability to absorb and withstand disturbances and crises; redundancy, the excess capacity and backup systems enable the maintenance of core functionality in the event of disturbances; resourcefulness, the ability to adapt to crises, respond flexibility, and—when possible—transform a negative impact into a positive.

Robustness, in turn, requires modularity and adaptive decision-making models. Whereas:

- Modularity: Mechanisms designed to prevent unexpected shocks in one part of a system from spreading to other parts of a system can localize their impact;

- Adaptive decision-making models: Networked managerial structures can allow an organization to become more or less centralized depending on circumstances.

Redundancy implies repetition of parts or duplication of critical infrastructure and diversity of solutions and strategies; in details:

- Redundancy of critical infrastructure: Designing replication of modules which are not strictly necessary to maintaining core function day to day, but are necessary to maintaining core function in the event of crises.
- Diversity of solutions and strategy: Promoting diversity of mechanisms for a given function. Balancing diversity with efficiency and redundancy will enable communities and countries to cope and adapt better than those that have none.

Resourcefulness implies the capacity for self-organization, creativity, and innovation, like:

- Capacity for self-organization: This includes factors such as the extent of social and human capital, the relationship between social networks and state, and the existence of institutions that enable face-to-face networking, the capacity to balance several opposite forces (e.g., Hedberg et al. 1976). These factors are critical in circumstances such as failures of government institutions when communities need to self-organize and continue to deliver essential public services;
- Creativity and innovation: the ability to innovate is linked to the availability of spare resources and the rigidity of boundaries between disciplines, organizations, and social groups.

Given this working definition of the resilient organization, it is almost obvious that the classical concept of "efficiency" applied to organizational structures and the use of resources does not convince us anymore (e.g., Håkonsson et al. 2013). Slack resources are fundamental to our definition of resilience (Schulman 1993). Woods (2006) similarly discusses the importance of maintaining an up-to-date understanding and sensitivity to where an organization is operating with respect to its limits (i.e., how much margin exists). The idea of margin is essential to resilience because maintaining an adequate margin is necessary for responding to unexpected events, and an organization that operates beyond its comfortable margin for too long is inviting disaster. The conventional meaning of "efficiency" contrasts with the idea of preserving margins as it is generally used to express the capability of a specific application of effort to produce a specific outcome with a minimum amount or quantity of waste, expense, and unnecessary effort.

To reinforce our developmental perspective, it is not merely the stock of resources that determines resilience, but also the deployment of these resources. A developmental perspective implies the presence of latent resources that can be activated, combined, and recombined in new situations as challenges arise. That is, resilient organizations seem to turn traditional organization theory on its head by deploying resources rather than restricting the deployment of resources, as posited by the classical perspective of treating threats in a rigid and negative way (Staw et al. 1981).

We argue here that resilient organizations aim to restore "efficacy" by enhancing their ability to quickly process feedback and flexibly rearrange, combine, and deploy resources in new ways.

## 9.4 Micro Organizational Features—Promoting Resilience via HR Strategic Management

Organizational resilience can be achieved by nurturing resilient behaviors. In this sense, the HR system can play a fundamental role in developing organizational resilience by building and maintaining a workforce with the capacity to anticipate, respond, and/or rapidly recover from a disruptive event (Mallak 1998; Vogus and Sutcliffe 2007). In fact, both strategic and operational aspects of HR (Arthur and Boyles 2007; Becker and Gerhart 1996; Lepak et al. 2004; Schuler 1992) can be formulated and implemented in line with the need to have resources and organizational structures constantly available for change. In this sense, all the practices related to recruitment and selection processes (Par. 2.2.1), internal mobility (Par. 2.2.2), performance evaluation and compensation mechanism (Par. 2.2.3), and learning (Par. 2.2.4) should be formulated and implemented by taking into consideration the need of the organization to have HRs able to find and implement resilient solutions and behave according to the needs for resilience. We now consider these three levels separately, aware of the fact that they have to be managed as mutually interacting.

### 9.4.1 Recruitment and Selection Process

In complex environments, where the unexpected is an increasing part of the everyday experience, organizations, their units and their members may have limited capacity to anticipate every challenge that arises (Weick et al. 2005). Resilience is having the necessary capacity "to cope with unanticipated dangers after they become manifest" (Wildavsky 1988, p. 147) and, as considered in this work, is a multifaceted construct (Cascio 2012), mainly composed of three elements: behavioral, cognitive, and contextual:

- Behavioral elements can be developed through a combination of practiced resourcefulness and counterintuitive agility juxtaposed with useful habits and behavioral preparedness (Lengnick-Hall and Beck 2003, 2005). Combined these behaviors create centrifugal forces (influences that make ideas, knowledge and information available for creative action) and centripetal forces (influences that direct inputs and processes toward actionable solutions) enabling a firm to learn more about a situation and to fully use its own resources under conditions that are uncertain and surprising (Sheremata 2000).
- Cognitive factors represent the shared mindset that enables a firm to move forward with flexibility. They are an intricate blend of expertise, opportunism, creativity, and decisiveness despite uncertainty. Cognitive foundations for resilience require a solid grasp on reality and a relentless desire to question fundamental assumptions. In addition, alertness or mindfulness that prompts an organization to

continuously consider and refine its expectations and perspectives on current functioning enables a firm to more adeptly manage environmental complexities (Weick and Sutcliffe 2007).

- Contextual conditions that support resilience rely on relationships within and outside an organization to facilitate effective responses to environmental complexities. In that, resilience brings together the three distinct perspectives identified by Gunz and Mayrhofer (2011, p. 253): conditionary, boundative, and temporal; in this same vein, the resilient organization can be seen as a contextualized configuration to tackle external uncertainty and equivocality (Mayrhofer et al. 2007). The four essential contextual conditions for resilience include: psychological safety, deep social capital, diffuse power and accountability, and broad resource networks (Lengnick-Hall and Beck 2003, 2005). Combined together, these factors promote interpersonal connections and resource supply lines that lead to the ability to act quickly under emerging conditions that are uncertain and surprising.

Recruitment and selection processes must be accompanied by the analysis of the actual possession and ability to put into practice of these three elements and the associated competencies.

### 9.4.2 Internal Mobility

The assumption that resilience is dynamic in nature fits with the consideration that internal mobility—referred to the change of role that a worker may engage within the organization, shifting from one organizational unit to a different one, and so performing various activities—can activate capacity for resilience. In this sense, it should be strategic for organizations to develop a mobility program internally consistent and directed at nurturing the cognitive, behavioral, and contextual dimensions of resilience (e.g., Poole 1990; Scullion 2005) for each employee by facilitating mobility between organizational units.

### 9.4.3 Performance Evaluation and Compensation Mechanism

The performance of individuals against organizational goals determines whether the organization meets its goals. The basic objectives of performance evaluations are twofold: first to reward employees for meeting organizational objectives and second to identify which objectives are not met and to develop action plans to ensure they are achieved in future.

Inside resilient organization, the assessment of the employee can be parameterized both on standard criteria (ability to reach fixed goals by following the proper organizational behavior) than on the ability to identify and implement resilient solutions, that is, new and no orthodox ones.

Moreover, some factors like learning from events and near events, learning from mistakes, ability to effectively communicate, ability to reorganize in response to crisis can be positively rewarded.

### 9.4.4 Learning

The modulus of resilience is related to organizational learning, that is the ability and readiness to activate multiple learning processes every time something negative occurs.

Two specific beliefs seem to anchor resilient organizations. First, these organizations treat success lightly and are leery because of the potential for the unexpected to occur (Weick and Sutcliffe 2001). In other words, resilient organizations assume that their model of risks is in need of regular updating, that their countermeasures are incomplete, and that their grasp on safe operations is fragile. Second, resilient organizations also believe that they can readily cope with a wide array of anomalies and are constantly striving to grow their capabilities to do so. Resilient organizations believe that they are imperfect but can achieve excellence over time through learning from events and near events. Moreover, resilient organizations are constantly engaged in:

– proactive and preemptive analysis of possible vulnerabilities (fear of failure);
– the questioning of assumptions and received wisdom to create a more complete picture (reluctance to simplify interpretations);
– discussion of the human and organizational capabilities that enable safe performance (sensitivity to operations);
– attempts to learn collectively from the errors that have occurred (commitment to resilience); and,
– making decisions to transfer the person or the people with the greatest expertise to deal with the problem at hand regardless of rank (deference to expertise).

These behaviors enable organizations to better detect and correct emerging and manifest errors in a timely manner, thus minimizing adverse outcomes. Hence, in contrast with the deterministic approach (Staw et al. 1981), we believe that resilience and the process of its generation can be better and more convincingly explained by adopting a developmental perspective. The notion that resilience is "developmental" is crucial, as it emphasizes that it is developed over time by continually handling risks, stresses, and strains, and by allocating adequate resources in a proper way.

In actual fact, multiple resilience processes will occur. Every time a resilience process is completed, the organization believes it has returned to homeostasis. However, what really happens is that the organization has reached a higher level of functioning because by successfully mastering the resilience process, additional skills or abilities have been acquired. If the same or a similar trigger event occurs again, the organization will be able to cope with it in a more effective and efficient way.

Resilience is a dynamic process that refers to a successful answer despite adversity. The process needs to be kick started by a trigger. Although each resilience process seems to be a return to homeostasis, multiple resilience processes over time lead to an increase in the level of functioning.

The ability for self-awareness enables the organization to learn from past experiences. If the life of an organization is seen as a chain of infinite resilience processes, the final level of functioning (LF$f$) can be defined as the sum of all resilience processes (Eq. 9.1):

$$\mathrm{LF}f = \sum_{k=1}^{n} \mathrm{LF}(k) \tag{9.1}$$

Equation 9.1—The level of functioning

If and when cognitive and behavioral adjustments are sustained over time by the contextual conditions, the chain of multiple events—that generates the incremental change in level of functioning—presumes unlearning, relearning, and learning (see Hedberg 1981) which taken together constitute organizational renewal. To the extent that renewal processes become institutionalized, it follows that organizational lifetimes will be lengthened. In sum, the notion of crisis suggests that a seemingly life-threatening organizational crisis may ironically result in increased organizational vitality and longevity.

The unlearning process enables the long-term development of new responses and mental maps. As Underlined by Barnett and Pratt (2000), Hedberg (1981, p. 18) builds on Lewin's (1953) and Schein's (1985) frameworks. Hedberg's conceptualization of unlearning encompasses three distinct disconfirmation, or disassembly of: (1) preexisting "views;" (2) extant connections between stimuli and responses; (3) connections between responses. These phenomena create the state in which a person, or an organization, no longer recognizes what is perceived, what response to make, and how to assemble new responses to new situations. Barnett and Pratt (2000) define organizational learning "as a process through which knowledge about action-outcome relationships develops and may then modify collective behavior (Barnett 1994)" (p. 76).

## 9.5 The Search for a New Design Framework

From what has been presented so far, it appears that organizational resilience depends on the ability to restore efficacy and not merely or exclusively on the efficient use of resources. When the characteristics described above are considered, current managerial theories do not explain resilience in a comprehensive and consistent way.

The gaps that we are trying to fill can be categorized as structural (S), behavioral (B), and cognitive (C). The related conjectures are coded accordingly (S1, S2, S3, etc.). From a structural standpoint, the resilient organization is exposed and sensitive to external pressures, so it presents these characteristics:

- It is an open system with boundary spanning ($S_1$)
- It is a *robust* system, since:
  - It transforms unpredictable external shocks into new energy, and considers them as opportunities for learning ($S_2$);
  - Its post-shock equilibrium is *at least* equivalent to that of the starting conditions ($S_3$).

From a behavioral perspective, resilience confers inner reactivity on the organization, in which three phases can be identified:

- Detection of the stressor (and the related suffering caused by it) ($B_1$);
- Definition of a related coping strategy ($B_2$);
- Minimization of the friction time ($B_3$).

Such behavior requires a cognitive organizational system able to:

- Learn from experience ($C_1$);
- Seek new alternatives or better settings in which to operate ($C_2$)
- Act in a preemptive and proactive way ($C_3$).

The consideration of these features requires different theories to be evoked coming from different fields. We argue that a resilient organization has to be conceived as an open system made of strictly interconnected behaviors and structures. Moreover, overtaking Mallak's (1998) and Bell's (2002) definitions, in our view a resilient organization has to be able to put itself in a condition where it can behave proactively and be adaptive. We mean that, if needed, it has to adopt an anticipatory, change-oriented, and self-initiating type of behavior. Proactive behavior involves acting in advance of a situation arising, rather than just reacting to it. It means taking control and making things happen rather than just adjusting to a situation or waiting for something to happen.

From our perspective, mainstream approaches and existing theories seem to partly cover the aspects of the emerging and complex phenomenon of resilient organizations. Despite their inner limits, these organizations are precious sources of knowledge for putting conjectures to the test and, eventually, for contributing to the understanding of organizational resilience. The theories that can help achieve a comprehensive understanding of organizational resilience are summarized below:

- The system theory (Von Bertalanffy 1950a, 1950b) describes the openness of the systems and the dynamics of interaction with the external environment (see S1). When a system is exposed to a stressor, it can either respond by trying to converge toward the pre-existing steady state of equilibrium (via negative feedback loops, to homeostasis) or by targeting a steady flow of development (via positive feedback loops, to homeorhesis) (see S3). The transformation of external shocks into opportunities for learning and reacting (see S2) is not very far removed from the mechanisms of entropy/negative entropy applied to physical and biological systems. As Cohen and Wartofsky (1980) have underlined, the notion of "autopoiesis" discussed by Maturana (1970) and Maturana and Varela (1973) refers to "autonomous, self-referring and self-constructing [yet] closed systems" (Cohen and Wartofsky 1980, p. v). Thus, it seems that the synergic action of acting and learning can be ascribed to cognitive elements borrowed from more recent psychological studies.
- The contingency theory, both in its original contributions (Burns and Stalker 1961; Lawrence and Lorsch 1967; Emery and Trist 1965) and its more recent contributions (Carroll 2012; Puranam 2012; Helfat and Samina 2014) classifies the external environment in terms of its complexity, uncertainty, and equivocality, and in the way these phenomena affect the internal structure of organizations (see S2, S3). Moreover, if we accept the strategic alternatives described by Miles and Snow (1978) as part of the "situation fit" (see Burton, Lauridsen,

and Obel 2002), the contingency approach can explain some proactive behaviors (e.g., exploration), but it does not properly take account of learning and preemptive actions (Schoonhoven 1981; Padget 1992; Hambrick and Cannella 2004).

– Managerial theories dealing with strategy and structure (see B1) can be classified in two ways: (a) in a Chandlerian fashion, whereby structure follows strategy (Chandler 1962), (b) the alternative view according to which strategy follows structure (Hall and Saias 1980), or by (c) a balance of these views. As for the last of these, Mintzberg (1990) offered a balanced view, arguing that the relationship between strategy and structure is reciprocal: "Structure follows strategy … as the left foot follows the right." Nevertheless, the configuration framework that he proposed is a model that describes only six valid organizational configurations (originally five; the sixth was added later) and six mechanisms (mutual adjustment, direct supervision, standardization of work processes, standardization of output, standardization of skills, standardization of norms) for the coordination of different tasks. Such a classification appears to be too reductive for explaining the functioning of a resilient organization. Moreover, we consider the assertion that each organization can consist of a maximum of six basic parts is absolutely inadequate—these parts are as follows: the strategic apex (top management), the middle line (middle management), the operating core (operations, operational processes), the technostructure (analysts that design systems, processes, etc.), the support staff (support outside the operating workflow), and the ideology (halo of beliefs and traditions, norms, values, culture; Schein 1978). Perhaps, the most distinctive feature of Mintzberg's research findings and writings on business strategy is that they often emphasized the importance of emergent strategy, which arises informally at any level in an organization and is an alternative to or complements the deliberate strategy determined consciously either by top management or with the acquiescence of top management. The limits of the recalled theoretical contribution shed light on the fact that probably the resilient organizations have to be studied in a wider framework, in which the strategic solutions of exploitation and exploration could be pursued in a complementary and non-exclusive way (Miles et al. 2006). More recent contributions appeared on the

Journal of Organization Design raise important points that would help design structural solutions for resilient organizations. In particular, according to Carroll (2012), the pursuit of both exploration and exploitation could be reached through a continuous and incremental reconfiguration of the organization. As the author recalls: "Continuous, incremental redesign may sound ideal. However, frequent reconfiguration of organizational boundaries can be costly and not necessarily successful … firms that have limited resources for reconfiguration may be dissuaded from this type of process." (Carroll 2012, p. 67). Further, it seems that the resilient organization requires structural design coming from "a rejuvenated and useful branch of organization science" with a "high level of consilience" (meant as the importance of scientific explanation at one level of aggregation based on scientific knowledge about lower order phenomena) and the prototyping of new organizational forms (Puranam 2012, p. 18–19).

From what has been considered so far, although system theory covers the main features of an organization, it is still too generic and not sufficiently exhaustive and accurate to explain and interpret resilient organizations. Managerial theories, individually considered, are not able to explain resilience. In fact, none of them is able to deal with the phenomenon of resilience and all its behavioral and structural features. Instead, theories from other fields can better cope with the phenomenon itself, and with its implications for behaviors and structures.

The cognitive side of a resilient organization (see C1, C2, C3) can be analyzed through the concept of self-efficacy and the coping strategies developed in the field of psychology, and particularly in psychosocial training. One of the ways to develop self-efficacy is via direct experience, which is made tangible in psychosocial training. High self-efficacy weakens work-related stress (Perrewé et al. 2002; Bandura 2006), especially when accompanied by the conscious use of active coping strategies (Jex et al. 2001). The literature on stress and coping emphasizes the primary role of cognitive appraisal in the stress process (Lazarus and Folkman 1984; Moos and Schaefer 1993). Coping is generally defined as behavioral or cognitive efforts to manage situations that are appraised as stressful; an individual effort is made to reduce stress. Problem-focused coping has been associated with different levels of stress (Brown et al. 2002). According to Bandura (1997), stress reactions depend on the self-appraisal of one's coping capabilities. Lazarus and Folkman (1984) have defined coping as a process by which individuals, upon perceiving a situation as stressful, evaluate and implement coping strategies. Coping strategies are appraisals or behaviors employed to reduce emotional and physical reactions to stressors. Several studies have found that communication skills prevent problems derived from work-related stress (Shimizu et al. 2003), and that problem-solving skills help in coping with stressful situations (Cox 1987).

## 9.6 Discussion and Conclusions

Resilience is an organizational competence that can be nurtured, improved, and consolidated through learning processes, and can be a source of strategic sustainability for organizations. Being composed of different elements that have to be combined dynamically, resilience cannot be considered automatic in management, therefore it requires an appropriate managerial style.

Our analysis has shed light in an original way on both the entities (resilient organizations) and the phenomenon (organizational resilience) by filling a gap in the knowledge about a consistent and comprehensive framework. In doing so, the intent of our work was to contribute to the ongoing academic debate on how organizations can face unexpected events. At the same time, the idea was to give managers and policymakers a systemic view in which to operate their choices, overcoming the partial and scattered indications coming from the heterogeneous and fragmented extant literature on the subject. We suggest that managers should intervene on both macro and micro features in order to promote organizational resilience.

## 9.7 Future Research

Considering the unsatisfactory exhaustiveness of the literature on this subject and the potential scope for further work based on a fresh impulse, we argue that to exhaustively describe the emerging phenomenon of resilient organizations both managerial and non-managerial theories, models, and components are needed. In fact, the proposed perspective enriches the field of organization design by proposing a structural framework for creating resilient organizations which can be developed within the contingency perspective (e.g., Burton and Obel 1988; Donaldson and Joffe 2014), Välikangas and Romme 2013) rather than rely on organizational improvisation (e.g., Cunha et al. 1999). Further, this chapter aims at addressing the current research on the subject to reconsider the physics foundation of organizational resilience in order to produce organizational design feature that managers could practically implement. Therefore, we see a potential space for the academic debate to help the managerial practice deal with resilience by providing a new and convincing perspective on the subject.

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# 10

# Issues of Control in Hybrids and "New" Organizations

**Maria Carmela Annosi**

## 10.1 Introduction

Firms of today evaluate the possibility to apply the design of both agile and lean systems within the boundaries of the same organization with the intent to reach more responsiveness, better level of productivity and an increased efficiency. The application of agile software development methodologies (Martin et al. 2003), specifically, has promised to satisfy the need for an increased level of responsiveness and flexibility through the implementation of a "heterarchy" constituted by self-managing teams whose belonging individuals cooperate, discover new solutions to fix emergent problems while utilize their freshness of mind to solve complex tasks with creativity (Morgan and Ramirez 1984).

However, substantial research is still needed on how to design and manage organizations that can respond to the uncertainties and

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demands of new business environments (Ilinitch et al. 1996). This study illuminates on the organizational controls utilized by firms embracing new organizational forms. For organizational control, we mean any process by which organizational members create attention, motivate, and inspire others to operate along desirable directions for the accomplishment of strategic organizational objectives (Cardinal 2001).

Organizational controls are commonly recognized as fundamental to the functioning and performance of organizations and their units (Henderson and Lee 1992; Jaworski et al. 1993; Loughry and Tosi 2008), but there is still a lack of theoretical explanation for how controls, in the new organizational context, operate in combination for how and why they impact organizationally relevant outcomes (Kirsch and Choudhury 2010), as organizational learning. Additionally, after decades of scholarly focus on the formal, hierarchical control exercised by managers, in this new setting, informal control has more recently been acknowledged as a widespread organizational phenomenon with a profound impact on the functioning of organizational units in general (Loughry 2010) and on teams in particular (Barker 1993). The theoretical foundation of the capability of bureaucracy to answer to the emergent environmental needs to acquire velocity is then varied (Adler and Borys 1996). For knowledge-based goods, the bureaucracy, as strategy, appeared difficult to execute since the transition from physical to information-based goods changed what represents the organizational core: the knowledge workers and professionals. If top-down decision-making processes and the structures secure the rapid organizational alignment favor rapid changes, information about the need for changes requires to be channeled toward proper decision makers and back again to the organizational members involved in the operations. This may slow down the needed adaptation when the change is mandatory. Loosely coupled organizations, instead, can be better suitable to detect a possible issue and answer more quickly to problems.

Consequently, a “horizontal shift” has replaced hierarchical forms (Kanter 1992). Business process reengineering operates through cross-functional processes delayering and giving empowerment (Hammer and Champy 1993) with the aim to place decisions where important knowledge and information are and to improve organizations’ readiness to change. Self-managing teams, working cross-functionally on a bulk of products are the basis of post-bureaucratic organizational structures, promoting the decentralization of authority (Child and McGrath 2001; Josserand 2004) and the empowerment of employees (Osborne and Plastrik 1997; Child and McGrath 2001).

Nevertheless, decentralization and local adaptation can enact a dysfunctional (or myopic) constraint on systemic change (Levinthal and March 1993). Additionally, coordination issue with the loosely coupled organizational form may inhibit teams and people to collaborate effectively with other teams as well as within their own team. On that purpose, Bigley and Robert (2001) propose the cognitive concept of collective mind for teams to work heedfully in a way that teams have enough knowledge to collectively cope with emerging contingencies having no related team member the knowledge needed (see Weick and Roberts 1993). Past research devotes poor effort in examining the organizational change from an internal perspective (Greenwood and Hinings 1996) and consequently of organizational learning in post-bureaucratic organizations. In fact, organization changes require organizational learning (Greenwood and Hinings 1996). Organizations adapt cautiously to changing reality and employ the collected internal knowledge to offensively improve the adhere of the organization to the environment (Hedberg 1981). Using the terminology of Argyris and Schon (1978), organizations should embrace single-loop learning to secure creating continuity, consistency, and stability. However, organizational designs, if defective and unfinished, need continuous and monitoring to environment.

> The degree to which organizations combine the exploration of new features and the exploitation of is of crucial relevance to effective learning (March 1991; Hedberg and Jonsson 1978). However, not only the relationship between change and learning should be taken into account, but also the relationship between learning and organizational controls. Change from one archetype to another leads to the design of new organizational structures and control systems, adopting new behaviors, and reading phenomena under different perspectives.

In this chapter, a neo-institutional theory perspective is adopted to build a multilevel framework able to highlight mechanisms favoring adaptation in self-managed team-based organizations. With this aim, this chapter provides a theoretical contributions to the arena of organizational controls by contributing to advance the understanding on how self-managing team-based organizations learn and specifically by shedding lights on the organizational control underlying the self-regulative learning processes. The multilevel framework offered by this chapter explains how to shape the knowledge production and acquisition in such a type of firms which in turn co-evolve with the emergence of new organization forms, managerial cognitive capabilities and proper educational systems for operative layers.

## 10.2 Multilevel Theoretical Framework

Post-bureaucratic organizations rely on a newly introduced concept of self-regulated teams in order to adapt and change to fit into the new business environment. A strategy that is adaptive is in fact implemented by firms, where the adaptiveness of organization partly is based on the decentralization of information and on the team's ability to detect when response modifications are necessary.

With the transition to post-bureaucratic structures, a new vocabulary of governance mechanisms is introduced, leading to delegitimize existing organizational form of controls and to the institution of new cultural-cognitive conceptions that give the foundations for new policies, new mechanisms, and new normative framework. Additionally, as organizations are propagating the adoption of new concepts, values, and routines (Boli and Thomas 1999), the related resulting changes often look like hybrids, which can be seen as organizational forms integrating new and old elements through bricolage (Campbell 1997).

The foregoing proposes a summary of the types of organizational controls that facilitate the realization of a closer empirical investigation on institutional change in such a context.

In the past decades, scholars have executed several good reviews of institutional theory (see Scott 1995, 2001; Tolbert and Zucker 1996).

As an alternative, we, instead, decided to devote our attention more on a set of central forms of organizational control underlying the institutional changes in post-bureaucratic organizational structures and to adopt a multilevel perspective to elicit the conditions for their activation and formation. Several authors (e.g., Gersick 1991; Pettigrew 1992) suggest to conduct the analysis of organizational change by adopting a multilevel perspective in order to allow for a simultaneous examination of the organizational and institutional contexts in which change happens. However, a multilevel perspective has been adopted by few empirical research. Valuable exemptions can consider the following works: Ginsberg and Venkatraman 1992, Thomas et al. 1994. Paying no attention to a multilevel perspective leads to a missed comprehension of how organizational change origins and is impacted by its temporal and institutional context (Greenwood and Hinings 1993). If the patterns of changes in the institutional context are not analyzed simultaneously with changes within the firm, the comprehension of the possible causes of diverse modes of organizational adaptation resulted limited.

### 10.2.1 The Importance of Revealing First-Order Change: The Team Identity

Research on organizational change has left many questions still unanswered. The when, how, and why an organizational change occurs after a pressing institutional change, are not clear yet. On that purpose, Huff et al. (1992) raised the call for more understanding of the order of events defining how organizations evolve to adjust to the contextual changes and under which conditions these events trigger a second-order change prescribing the change of the system itself or a reduced first-order change which happens within the boundaries of the system itself.

Many authors have defined second-order changes as pure answers to environmental disorder (e.g., Meyer et al. 1990). Cuspcatastrophe models (e.g., Gresov et al. 1993) or changes in the firm's strategic orientation (Zajac and Shortell 1989), organizational identity (Dutton and Dukerich 1991; Dutton et al. 1994), structure (Meyer and Rowan

1977), or the cognitive maps of high-level managers (Barr et al. 1992) have been used to describe as second-order change.

However, second-order change, implying a radical change from one strategic positioning to another (cf Greenwood and Hinings 1988), is not of environmental disorder (Tushman and Romanelli 1985). Scholars have recognized, for instance, that firms usually concentrated on a dominant archetype characterizing by strategic positioning and inertia are inclining to limit the firm change to that, realizing a first-order change (Fox-Wolfgramm et al. 1998).

### 10.2.2 The Relevance of Identity as First-Order Change

Normative, mimetic and coercive forces help an organization to adapt by embracing a similar approach to remain legitimated (DiMaggio and Powell 1983). Coercive isomorphism may happen when a firm's behavioral choices result similar to those of other firms under the effect of an institutional regulation. Mimetic isomorphism is present when a firm imitates peculiarities of other firms' mechanisms that are considered effective in an unstable institutional environment. At the end, normative isomorphism occurs when a firm's change mirrors the normative and professionalization structure formed inside the institutional environment (Levitt and Nass 1989). Therefore, the institutional environment could be used to cage the preferences and operations of firms, ending with analogous patterns of firm adaptation.

However, Greenwood and Hinings (1993) observed that firms depend on biographies since they influence their way to respond to change. Identities represent the means through which their biographies exercise their influence. Albert and Whetten (1985) talked about identity as a core, characteristic and stable concept of a firm. Dutton et al. (1994) reported the importance to discriminate between how organizational actors see themselves (identity) and how they believe others, see them (built external identity or image). Image and identity establish a path dependency with the past (who we used to be), represent the present (who we are now) and the future (who we want to become) (e.g., Markus and Nurius 1986). According to past studies, (Dutton and Dukerich 1991; Elsbach and Kramer 1996) both image and identity affect firm adaptation. In line with this, more recent studies have deeply analyzed and described identity and image as key concepts to define and clarify individual and organizational behavior (see Whetten and Godfrey 1998).

### 10.2.3 Structures, Norms and the Interpretative Schema Within Second-Order Change

Second-order change is a radical, discontinuous shift in interpretative scheme leading to change in organizational paradigms, norms, and policies (Argyris and Schon 1978; Sheldon 1980; Hedberg 1981; Tushman and Romanelli 1985).

Quinn and Cameron (1983) and Torbert (1976) reported that organizations having a more decentralized structure and allowing for more participation in decision making are more likely to be subjected to a fundamental revision of their interpretative schemes. The introduction of much more participative structures, relying on the association of individual provinces, favored the elicitation of alternative perspectives to begin. Additionally, Miller and Friesen (1984) and Morgan and Ramirez (1984) suggested that firms encouraging participations in the occasion of the revision of their interpretative schemes are more likely to reach a second-order change.

On the other hand, Ranson et al. (1980) suggested that organizational structures not only communicate interpretative schemes but also the actions (norms) deriving from them. Behind this proposal, there is the idea that structural change is more directly tied to an action that comes from change in interpretative schemas than to the changing interpretative schemes themselves. In line with this, Giddens' (1979) statement that structural design choices are in a reciprocal relationships with individual's actions and cognition. Giddens (1979) also proposed that structural features can be considered both the means and outcome of individual's actions: they provide the rules and resources individuals relied on to act, but they endure only through being enacted and modified in action. Individual actions are both legitimized and constrained by organization's structures. Once interpretative schemes and their enactment in action change, then, the structure will also receive change which then will legitimize and cage subsequent actions and interpretative schemes.

Thus, during a period of second-order change in interpretative schemes, structural properties become reciprocally connected with interpretive schemes and actions (norms) at the same manner as the relationship between the interpretative schemes and actions. In turn, these structural properties, interpretative schemes, and actions are all changed interacting each other.

### 10.2.4 The Relevance of Strategic Orientation, as Further First-Order Change

A second means for the organizations' biographies to exercise their influence is their strategic positioning. The typology of strategic positioning proposed in Miles and Snow's (1996) is aligned with the concept of design archetype suggested in Greenwood and Hinings (1988) since it considers the concepts, principles, and standards or beliefs regarding how a firm needs to operate, be assessed, and how these aspects need to be mirrored in the organizational processes and structures.

Additionally, strategic orientation is also in line with the term "interpretive schemes", which is close to these concepts including shared meanings or paradigms (Kuhn 1970; Brown 1978; Sheldon 1980; Pfeffer 1981; Benson 1983), beliefs (Sproull 1981), ideologies (Beyer 1981; Starbuck 1982), schemata (Weick 1979) and with some definitions as organizational culture (Jelinek et al. 1983).

The ways organizational members understand and interpret events have an impact on both their individual reactions and organizational behaviors (e.g. Frost et al. 1985). Accordingly, Ranson et al. (1980) indicated organizational members' "interpretive schemes" and their expression in "provinces of meaning" as most influential factors on the design of organization's structure.

Ranson et al. (1980) used the concept of interpretive schemes from Giddens (1979) to delineate the cognitive schemata that represent our experience of the world, determining both its crucial dimensions and how we are to comprehend them. Interpretive schemes act as shared, crucial assumptions about the reason for which situations occur as they do and how individuals behave in diverse situations.

However, strategic decision making, as reported in Hodgkinson and Healey (2011) and Teece's (2007), require situations in which emotions and cognitions need to be consciously mixed in dynamic capabilities because emotions give indications about how to interpret organizational events. Yet emotions, if too intense, can cage individuals' knowledge-seeking and knowledge processing capabilities (Williams 2007). Emotions, if neglected or repressed, can induce individuals to miss signals (Seo and Barrett 2007; Seo et al. 2004), such as the signals indicating changes. Thus, within a social environment, a context of hot cognition may happen—where emotions and cognition are both required to make decisions about which cognitively derived actions to use.

Following Hodgkinson and Healey (2011), we can state that individuals, in an intense social context as the one of self-managing teams, must interact in ways that attend to both emotions and cognitions in all aspects of the interaction process. Additionally, Hodgkinson and Healey (2011) propone that for a company to effectively decide and evolve in a context of hot cognition, three capabilities—sensing, seizing, and reconfiguring—are needed, and the ability to use both emotional and cognitive cues is a critical element of these capabilities.

### 10.2.5 Influence Between Interorganization Controls and Team's Sensing Capabilities

Hodgkinson and Healey (2011) describe sensing as the use of emotions and cognitions during the scanning, searching, and shaping of opportunities and threats in response to changes in the environment. We define sensing, in the group, as the process of attending to, interpreting, and evaluating the emotions of the others and oneself as the interaction unfolds. When all the individuals in a team are able to sense, the team has sensing capabilities. Interorganizational controls refer to methods able to prepare and reward employees for their internal collaborations, procedures acting as surveillance mechanisms aiming to monitor collaborations, and criteria for deciding when to intervene on ongoing collaborations (Brown and Duguid 2001; Kale et al. 2000; Mayer and Argyres 2004; Ring and Van de Ven 1992, 1994). The controls shape the individual ability to sense changes in emotional valence and intensity. When organization controls dampen sensing or are inconsistent in the ways that individuals in a group can improve sensing capabilities, then sensing capabilities are incriminated. Home organization controls can reduce sensing capabilities if the interacting individuals in dyad or groups do not have enough behavioral autonomy to interact and communicate emotions (Faems et al. 2010). Home organization controls can also reduce sensing when the display rules or "feeling rules" are meant to repress emotional expression (Williams 2007: 596). Display rules, limiting interaction and repressing emotions, reduces an individual's ability to sense valences while it ensures that the needs of the other individuals in the dyad or group are met. Sensing capabilities are also restricted when organization controls seem inconsistent between home organizations. If one home organization's display rules allow expression of emotion and the presence of concertive controls in a group do not (Barker 1993), then the manner in which the group uses emotions is compromised, making it difficult for each individual to take appropriate actions to move forward. Similarly, inconsistencies in how home organizations monitor the progress of groups' performance may interfere with the group's sensing capabilities. If one home organization underlines goal achievement in its monitoring efforts while the other home organization (e.g., the team environment) underlines antigoal avoidance (Browning et al. 1995), individuals' emotional valences and intensities will mirror these differences, making it harder to understand if changes in valences and intensities stem from behaviors that occur within the group or from pressures from the home organization.

### 10.2.6 Influence Between Home Organization Controls and Team' Seizing Capabilities

According to Hodgkinson and Healy, seizing regards the process of "evaluating and selecting new opportunities" (2011: 1507). We define seizing, in teams, as the process of acting on sensed emotions by dynamically using collective knowledge segmentation actions. When all individuals in a team are able to seize dynamically, the team has seizing capabilities. Self-regulation theory states that individuals participate in action programs, which are a group of behaviors embraced to decide when and how to apply actions (Carver and Scheier 1998; Lord et al. 2010; Lord and Hanges 1987; Taylor et al. 1984). Through an interaction, an action will be adopted as long as it implies a positive actual trajectory toward a goal and away from an antigoal. As any single action is likely to impact multiple goal trajectories simultaneously, the effects on each trajectory must be iteratively assessed after each action (Carver and Scheier 1998). To raise positive trajectories, individuals have a repertoire of actions that allow them to trial with different actions.

Home organizations may have controls that restrict teams' seizing capabilities. In seizing, consistency of controls across home organizations is crucial, as is the behavioral autonomy that controls give to the interacting people within the team.

Organization controls might foresee rules to constrain the repertoire that individuals can adopt as knowledge segmentation actions (Bogers 2011; Faems et al. 2008; Jarvenpaa and Majchrzak 2008). Such restriction might derive from a lack of awareness of different actions or from biases toward some knowledge segmentation actions (McEvily et al. 2003). These biases may stem from managers' faulty assumptions that actions that have worked in the past are likely to work in the present interaction (Doz 1996). Inconsistencies in acceptable repertoires across home organizations also limit seizing capabilities. If one home organization allows only limited options for changing actions and the other home organization allows broad options, the inconsistencies in repertoires complicate switching and can confuse the individuals in dyads or teams and raise concerns about the viability of the ongoing collaboration (Browning et al. 1995).

### 10.2.7 Influence Between Organization Controls and Teams' Reconfiguring Capabilities

Hodgkinson and Healey (2011) define reconfiguring capabilities at the organizational level as including the constant transformation of individuals' self-identities to support the actions seized in response to emotional sensing. In teams, individuals accomplish both the needs of their home organizations and the needs of their team. Thus, the team has reconfiguring capabilities when both individuals are able to use knowledge segmentation actions in a way that balances the interests of their home organization and their team.

Home organization controls impact the degree to which individuals in teams are able to maintain a balance between organizational and team self-identities. This balance demands recurrent feedback in teams, as well as the recurrent interaction between individuals inside the team and their home organizations. As with sensing and seizing capabilities, consistency in controls across the home organizations is needed. Frequent interactions are necessary to review subgoals and keep a balance between team self-identities and organizational self-identities. If one home organization excludes frequent interaction among the individuals in a teams, team self-identity is unlikely to be activated as strongly as home organizational self-identity (Faems et al. 2008, 2010), leading to imbalance. Even if the interaction is allowed, the greater salience of home organizational self-identity over team self-identity can result in inadequate knowledge sharing within the team. Thus, if the interaction is dominated by tight organization controls, such as frequent reporting, which induce individuals to comply with the needs of the home organization, ignoring the needs of the team (de Rond and Bouchikhi 2004).

On the other hand, even the interactions between individuals in the team and their home organizations need to be recurrent for the development of reconfiguring capabilities. Without such interactions, home organizations might exercise no control over the interacting individuals in the team, allowing the individuals to activate their team self-identities to a greater extent than their home organizational self-identities. Thus, if mentoring or management progress reviews become infrequent or insubstantial then the activation of team self-identities takes precedence over home organizational self-identities (Berends et al. 2011). Reduced interaction between the individuals in the team and their home organizations can rise management fears and lead to increased monitoring. Greater monitoring might lead not only to an imbalance of self-identities but to further declines in management confidence in the team, as well as to the possibility that management might discontinue the collaboration.

## 10.3 Research Questions

Though institutions help both to strongly direct change and to influence the kind of change transversely through levels and contexts, they also themselves change their nature and strength over time (Dacin et al. 2002). Under this perspective, we put more focus in advance our understandings of how institutions are formed, transformed, and put down and the manner through which institutional processes interrelate to influence institutional change.

Specifically, by focusing attention on the organizational controls originating the change or affecting it across time, an important contribution, explicitly relatively to the deinstitutionalization of current norms and routines could be made. Oliver (1992) and Scott (2001) stated that in the institutional theory it has been devoted much of the effort has been spent on institutional construction and on change processes. Nevertheless, a similarly relevant, despite under analyzed, phenomenon is deinstitutionalization, "the processes by which institutions weaken and disappear" (Scott 2001: 182). Scott emphasized the relevance of deinstitutionalization, observing that "it is useful to place studies of deinstitutionalization in a broader context of institutional change, since the weakening and disappearance of one set of beliefs and practices

**Table 10.1** Relevant core themes involved into different types of changes

| | Sub-core themes | Type of change |
|---|---|---|
| Identity | Team identity and image | First-order |
| | Organization identity and image | First -order |
| Strategic orientation | Team's cognition | First-order |
| | Team's emotions | First-order |
| | Team capabilities (sensing, seizing, reconfiguring) | First-order |
| Interpretative schema | Norms | Second-order |
| | Actions | Second-order |
| | Organizational structures | Second-order |

is likely to be associated with the arrival of new beliefs and practices" (2001: 184).

Specifically, we suggest to emphasize a relevant set of crucial themes which have been explored previously (see Table 10.1) to introduce three important questions, each of which is centrally related to the broad goal of the research on organizational controls:

1. What are the primary organizational controls mechanisms in charge to drive and shape institutional change within self-managing teams?
2. How do these organizational controls shape how teams answer to organizational change (by resistance or legitimation) and the beginning of institutional change?

Doing this, an important contribution to the literature on self-regulative systems is made since poor research attention has been given to the constitutive influence of regulative systems such as self-managing teams. However, it is also relevant that research studies focus their attention to the full selection of governance mechanisms in use. In the past decades, most research effort has been invested on the regulative role of governments and private governance systems (Dacin et al. 2002).

Regulative systems are often characterized by motivational dimension rather than compliance, but recent literature studies recommend that such programs and initiatives often reach better results with the normative and cognitive processes they activate than with their coercive mechanisms (Edelman and Suchman 1997; Luoma and Goodstein 1999). This justifies the emergence of newly concepts in Table 10.1.

Past research results in cognitive science and cognitive social psychology (e.g., de Mey 1982; Markus and Zajonc 1985) give means to understand first and second-order change which add more information to previous formulations. However, relations between these fields and organizational change, nevertheless, have seldom been drawn. This paper connects them explicitly, considering a multilevel description of the impacts derived from following emerging core themes:

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# 11

# Investigating the Impact of Agile Control Mechanisms on Learning in Scrum Teams

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## 11.1 Introduction

The issue of controlling R&D behaviors and outcomes has attracted the interest of many managers in the last decades (Kerssen-van Drongelen and Bilderbeek 1999). In the turbulent business environment, quick responses to change are vital for organizations to survive and this is made possible through a strong control of firms' behaviors. Moreover, organizations need to learn from the past, in order to be able to identify

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and fix errors (Akella 2007). A key to achieving the necessary organizational learning and change is the use of Management Control Systems (MCS), which is defined as a set of procedures and processes that managers may adopt to secure the accomplishment of organizational goals (Otley and Berry 1994). The scrum development process (Schwaber 1997) was presented as a new approach to product development with the potential to increase speed and flexibility. Nevertheless, despite the widespread usage of Scrum, there is still a shortage of research investigating its effects (Moe and Dingsøyr 2008). Scrum allows for coping with environmental unpredictability through the use of strict control mechanisms (Schwaber 1997) by leveraging a team's autonomy, thereby enabling responsiveness to change (Cohen and Bailey 1997). The apparent trade-off between the amount of process control and the freedom given to a team calls for a deeper analysis of the underlying mechanisms regulating a team's outcomes within the scrum context. This leads us to the purpose of this study, which is to investigate the effects of MCS on a scrum team's learning. The paper is structured as follows. In the next section, an overview of agile scrum methods and MCS is provided. Thereafter, the research methods used are described, followed by the presentation of empirical observations and identified MCS. Finally, main results are discussed, providing implications for theory and practice as well as insights for future research.

## 11.2 Theoretical Background

In this section, a brief overview of the relevant characteristics of agile scrum methods is provided together with a description of MCS.

### 11.2.1 Overview of the Agile Scrum Method

Agile methodologies include different agile software development methods, which are considered to be meant for lowering development costs and for gaining flexibility to survive in turbulent environments (Pikkarainen et al. 2008). Among them, Scrum (Schwaber et al. 2002) is the best known and it is described as a software development process executed by self-organizing teams working in short iterations called "sprints". A key practice in the scrum development approach is the product backlog, consisting of a prioritized list of product requirements, which is set by the product owner, a project's key stakeholder representing the customers in the team. The scrum framework requires a team's involvement in several ceremonies (Cohn 2009), such as: (i) the sprint planning, where the product backlog is filled through the active participation of the product owner, the scrum master, and the whole team; (ii) daily scrum meetings occurring every sprint day, when each team member reports what was performed the day before and what will be performed the coming day; (iii) retrospective, taking place at the end of the sprint to collectively reflect on the past sprint and to make continuous process improvements; iv) demo meetings for presenting the coded, tested, and workable piece of software produced by the team to the product owner, customers' representatives, management, and members from other teams. A relevant role in Scrum is covered by the scrum master who has to guarantee that the agile team conforms to scrum practices and values (Cohn 2009). Although Scrum is one of the most commonly adopted agile methodologies, it is clear that previous studies have mainly focused on the agile methods' introduction and adoption phases (Dybå and Dingsøyr 2008). Moreover, Dybå and Dingsøyr (2008) point to the lack of rigor of the current literature studies on agile topics, in particular concerning data collection and analysis, leading to a call for more reliable research in agile field.

### 11.2.2 Management Controls Systems

MCS can be grouped into formal and informal controls (Anthony et al. 1984), output and behavior controls (Ouchi 1977), market, bureaucracy and clan controls (Ouchi 1979), administrative and social controls (Hopwood 1976), and results, action and personnel controls (Merchant 1985). Simons (e.g., 1987, 1994, 1995) introduced a theory of how senior managers can utilize controls to develop and execute business strategy. These studies represented a step ahead in indicating ways senior managers may adopt MCS in strategy formulation and execution (Langfield-Smith 1997). In particular, Simons (1995) hypothesized that senior managers may utilize four different types of MCS related to the crucial aspects of successful strategy implementation: (1) core values shaping belief systems, (2) interactive control system (to control uncertainties) creating positive and inspirational forces, (3) boundary systems (to control risks), and (4) diagnostic control systems (to critical performance variables) providing constraints and inducing respect of rules. In particular, (1) *Belief control systems* are defined as formal mechanisms adopted by managers to describe, convey, and strengthen the essential values, goals and directions for the firm; (2) *Interactive control systems* consisting of formal mechanisms are adopted by managers to systematically and directly include themselves in employees' decision making; (3) *Boundary control systems* are described as formal mechanisms adopted by managers to assure that limitations and orders are respected; (4) *Diagnostic control systems* are formal feedback mechanisms adopted to check organizational outcomes and to adjust any variation from predefined sets of performance. At the team level, controls are identified with the processes used by a team's managers to focus the attention, coordinate team actions, and motivate team members to accomplish their tasks (Ouchi 1979). However, few studies have empirically investigated the different types of control at the team level (Chiang and Hung 2014). For identifying the interplay between the scrum process controls and the levers for shaping autonomous team's behaviors, Simons' (1994) MCS taxonomy was adopted, as it covers a wide range of formal, informal, and cultural controls (Langfield-Smith 1997) and potentially distinguishes the controlling effects of scrum managerial roles from the ones exercised by the scrum team's routines.

From the above one important research question emerges:

RQ1: How do control mechanisms embedded in the agile scrum methodology influence scrum team's self-regulated learning behaviors?

## 11.3 Methodological Approach

In this section, the research setting, and the research method, including data collection and data analysis, are presented.

### 11.3.1 Research Setting and Method

Adopting purposeful sampling (Patton 1990), four R&D organizations belonging to the same international company in the telecommunication industry were involved in the study. In all these organizations, scrum methods were used for feature development while a lightweight approach of Scrum was applied to the concept development activities. The agile teams were cross-functional and cross-product, counting on an average of 7 people, having different and complementary competences. In all the organizations, the agile transition was embraced in 2011 and concluded at the end of 2012, when all the people were allocated to different agile teams. This case study began in August 2013, one year after the end of the agile transformation. An abductive approach (Peirce 1931) was used, given the complexity of the topic and the lack of earlier rigorous studies analyzing the long-term effects of agile implementation. All the results were triangulated relying on a secondary source of data. This helped to increase the reliability and validity of our results. MAXQDA® tool, a qualitative data analysis program, was used during the whole data analysis, supporting the coding process, and offering a hierarchical organization of codes that allowed the subsequent exploration of data.

### 11.3.2 Data Collection

Covering all relevant organizational roles (agile product owners, scrum masters, agile team members, high-level managers) and involving all the four organizations through a purposeful sampling (Schatzman and Strauss 1973), 36 individual semi-structured interviews were conducted in a first stage. In contrast to this, in the second stage of interviews, 8 middle-level managers were also included in the initial sample, following a theoretical sampling (Draucker et al. 2007). As a third stage, some previous participants were invited to confirm specific concepts, and other agile team members were approached to test the emerging interpretations and ideas. The research group continued the data collection and the data analysis until no new data emerged and the identified concepts in the codebook were well described. Interview templates were used for each category of identified roles. Each interview lasted almost 60 minutes and was recorded, transcribed, and sent for validation to the interviewees involved.

### 11.3.3 Data Analysis

Given the lack of systematic literature studies on the usage of MCS in agile software development, an abductive approach was used. To generate new concepts and a reliable theoretical framework, the data were approached with as few preconceptions as possible. Then, once the theory started to emerge out of the observations, as Glaser (1998) suggests, relevant literature was then easily identified and read or reread to contribute to the nascent theory. In particular, the analysis of recent studies on Simons' (1994) MCS and self-regulated learning processes was deepened after the first stage of interviews. The coding process started with 'open coding' in which all the data were repeatedly read to get the whole meaning of the text. Working in pairs, the identification of codes was performed from scratch twice. The identified concepts were grouped into categories by comparing what emerged from each interview. Second, an 'axial coding' was endorsed to cluster the huge amount of emerged concepts into macro categories and subcategories, defining also their hierarchical relationships. Macro categories were connected to the relevant theoretical concepts contributing to the construction of a first theoretical framework, a so-called codebook. Results from the 'axial coding' are displayed in Table 11.1.

**Table 11.1** Sub-categories belonging to the category "Organizational Control Mechanisms" resulting from axial coding

| Sub-category | Sample of the belonging codes |
|---|---|
| Diagnostic control systems | - Short feedback loops for making the team's work flow<br>- Pressure on deadlines inhibits team to reserve time for learning or innovation<br>- Information radiators to track/share team's progress in performance and competence<br>- Self-assessment tool to monitor and align people to agile behaviors<br>- Management evaluation based on the team's performance and competence |
| Belief control systems—Team's beliefs | - Learning and innovation are not priorities as feature development<br>- Importance of broadening team's competence |
| Belief control systems—Line Manager's beliefs | - Need to foster knowledge sharing<br>- Importance of broadening team's competence |
| Belief control systems—High-level Manager's beliefs | - More relevant to be efficient than to learn and innovate<br>- Importance of broadening competence to generate new insights |
| Interactive control systems | - Product owner ensures the right focus and time to team's work<br>- Increased distance between line manager and team<br>- Management beliefs are reinforced through systematic interactions with product owner/scrum master |
| Boundary control systems | - Product owner puts limits and rules for the quality of the product<br>- Product backlog and bonus regulate what to do and extra-time use |

## 11.4 Results and Analysis

In this section, the results of the cross-case analysis of the four involved organizations are reported. In particular, the description of the main codes tied to the identified MCS (divided into diagnostic, belief, interactive, and boundary controls) is provided, together with some illustrative quotations from the respondents.

### 11.4.1 Diagnostic Control Systems

When the respondents were asked about the way they handled activities in the agile framework, they reported freely all the relevant details to allow us to identify goal setting and feedback loops involving individuals and teams. External team's stakeholders resulted to be the main references for team's goal setting and monitoring. Team's monitoring was facilitated by the agile framework made up of many ceremonies and routines articulating the team's work. In particular, the product owner prescribed what the team had to do within a specific time frame.

> The teams are rather involved in the features so they have more technical knowledge than us, we are providing shorten goals, we try to keep the focus within the sprint, looking at the general issue. [Product owner]

Teams were in charge to continuously report the status of their activities to their product owners according to what they committed to:

> I get updated info through several ways: weekly reports about the progress and then I have to report their progress to other forum like the release project. [Product owner]

At the end of each sprint, the product owners evaluated and approved what the teams did.

> In Scrum there is also a demo meeting in the end of the sprint, were the teams show the result of the user stories developed during the sprint. [Product owner]

Together with the product owner, the line manager appointed to the team added his/her own evaluation of team's performances. This results in a double feedback loop reinforcing the previous controls to speed up team's work.

> We receive feedback from our manager and product owner concerning if we have done a good job, if we have some areas to improve, in most cases we get positive feedbacks. We are evaluated in terms of sharpening our processes to be better in some areas we are not good at, improving our way of working. We have values stream mapping exercise so if we have underestimated any activities, the manager organizes meetings in which we talk about why it took so long. [Team member]

Beyond the formal evaluation check, teams were continuously pushed to make visible and update the progress of their work on the base of the estimations provided at the beginning of each sprint.

> Along the sprint, we update the use story with the status done (starting from the status ready) and we make everything visible on the scrum boards, making everything transparent because the work progress is constantly visualized. [Scrum master]

Moreover, team members were obliged to run daily integration tests in order to mitigate the risks coming from the integration of new product updates within a continuously evolving code due to the parallel development from other teams.

> The management wants us to deliver code every day for testing to find out if new code breaks legacy functionality. But the delivery process is not good enough, when people make mistakes you have to roll out back and many people are waiting for you. It is not so effective this way of working. [Team member]

In addition, all the team members had to present almost every day, through a public meeting, the results of the activities they had done the day before, involving their local stakeholders, such as the line manager and the product owner:

> We also have short daily stand-up meetings in which we discuss about what we have done and what we have to do, trying to avoid some technical discussion on how to solve something specific and so on, but it's quite difficult to implement. [Team member]

At the end of each sprint, people within teams were encouraged to reflect on what they did and how to improve their way of working (wow).

> At the end of the sprint we have retrospectives in which we talk about our wow and what improvements to have. We take notes and then we work on them, we can bring up different issues but in my experience I would say that mainly we discuss about the way of working. [Team member]

Moreover, individuals and teams were evaluated against specific dimensions related to the breadth of their team's and individual knowledge.

> We have a team self-assessment which is facilitated by the managers. The dimensions checked during this event are: Cross-functional competence and the number of block known. [Line manager]

### 11.4.2 Belief Control Systems

Individuals' and team's beliefs at operative and managerial level were mainly extracted from the answers to the interviews' open questions addressing learning and innovation opportunities within the teams and in the organizations.

### 11.4.3 Team Members

Within the teams there was a strong focus on feature development, inhibiting them to devote their time to learning and innovation. In fact, the huge amount of MCS and project routines led them to perceive feature development as their highest priority.

> Our team learning opportunity is not much, we have been working with two features at the same time. We had pressure for deliver those features and we don't have much time to dedicate to learning. It is not the priority as developing and delivering features so we don't spend time on learning. [Team member]

As a consequence of this, teams appeared to be completely stuck in feature development activities, as clearly observed by their line managers.

> So as a line manager I try to encourage them to prioritize their learning and innovation and making the product better, while on the other hand they are stuck with the fact they have to deliver because they are committed to this milestone. [Line manager]

On the other hand, teams believed in the importance of broadening their competences to be able to work on a wider set of activities and number of software blocks, as they had been asked to do since the agile transformation. In fact, team members were called to be cross-functional (covering different roles within the team) and cross-product (working on different parts of the system), since the teams had the responsibility to implement the whole feature.

> I need to be involved in more stuffs, now. Before, in the previous way of working, we only needed to focus on one subsystem but now we need to learn also different subsystem, we need to have some knowledge about testing because we have to cover different roles. [Team member]

### 11.4.4 Line Managers

In order to sustain the agile transformation, the basic values transmitted to the teams in the organization were the organizational needs to: (1) enlarge people's and a team's competences in order to let team members become cross-product and cross-functional, and (2) share the gained knowledge within the teams and in the organization to overcome the limits of the team's isolated product development.

> We reward the people who make the effort to be broader. The message we are trying to give is that we need people to be able to adapt to completely different business in a few years time […] We want to reward the responsiveness to be able to change and move into something not comfortable. That's a really important skill to have. [Line manager]

> […] so sharing is a big challenge as well. People should have the personality and mindset to share. They need to understand that through sharing they can help the team itself to be better. [Line manager]

## 11.4.5 High-Level Managers

The agile transformation was embraced by the high-level management with the aim to increase the organizational efficiency since the company was chased by its competitors. Hence, they chose to invest in quality improvement and productivity to maintain their market position, at the same time relegating innovation to a secondary organizational goal.

> My view about the main problem is that we need to be more efficient to produce more and then to be able to innovate. Becoming more efficient is a condition to have innovation in place, […] it is hard to get things into the product because the demand is there but the capability was low. [High level manager]

The agile transformation required a radically new approach to learning and competence management, pushing people to enlarge their knowledge. This credo had been transmitted to all the organizational layers as evident from line managers' and the team's beliefs.

> Learning is very much in focus in the agile transition, but there is no so much with innovation clearly in mind. We are expecting to enlarge people competence because people are embracing more challenge due the opportunities to touch more parts of products. [High level manager]

*Interactive control systems*

The managerial attention to agile values and practices was reinforced through a continuous interaction with other agile management roles.

We have sometimes meeting with scrum master and product owner to discuss some issues that we need to coordinate, we have also other formal meetings every third week of the month in order to discuss about impediments with scrum master and product owner. [Line manager]

The product owners were constantly striving to secure the team's attention to project development activities and the proper allocation of their working time, being involved in all the relevant agile ceremonies for decision making on team's plan and effort.

[which kind of information do you exchange with the teams?] Information to make sure that what team is doing is the highest prioritized and value giving work and if circumstance change I inform team and they also do the same so we get the flow going. [Product owner]

We have grooming, sprint planning, demo and quite a few technical meetings, in between when needed. At the grooming we walk through what is remaining in their sprint backlog and we either plan new tasks of the user stories. [Product owner]

### 11.4.6 Boundary Control Systems

Agile rituals and ceremonies identified and reinforced acceptable behaviors directed to fully saturate a team's capacity with pure project activities and collect fast feedback on the current progress of a team's work.

In agile we are in quite regular mode, working in a regular and constant time box, which is called sprint, three weeks long. At the beginning of each sprint we have half day meeting called sprint planning, where the agile team members are looking at the sprint backlog. As team, we know our capacity and according to our estimation of it, we take items in the product backlog, pulling out user stories. Among the user stories we have also some bonus. It deals with normal work as a normal user story, but differently from it, it represents something for which team does not take a specific commitment to implement by the end of the sprint […] It aims to full utilize the team's capacity if some spare time occurs. [Scrum master]

## 11.5 Discussion

In line with the purpose of the study, the concepts of MCS within the agile scrum framework were identified and their single and combined effects over team's learning behaviors were considered. In particular, this study showed how four types of MCS in combination reinforce each other and thereby shape a team's behavior and their motivational beliefs mainly toward the achievement of short-term goals. From the analysis of the empirical results above, it is evident that team members were induced to broaden their knowledge because of: (i) the diagnostic controls coming from the competence self-assessment, based on the number of blocks and practices they should know, and (ii) the belief controls exercised by the their external environment stressing the importance for them to broaden their knowledge in order to become more flexible. On the other hand, team members seemed inhibited in devoting time to learning by the combined and reinforced effects of the interactive, boundary, and diagnostic controls, which primarily fostered feature development activities. This led team members to embrace mainly an experimental type of learning, driven by what was just needed to accomplish their tasks. Consequently, this exposed them to the risk of learning different and uncorrelated parts of the system because of the diversified and rapidly changing impacts that the project development could bring, at the same time potentially preventing them from assimilating and retaining the knowledge they are exposed to. In addition, we argue that the interactive MCS in Scrum offer a feedforward control orientation that focuses team's attention on the feature work, whereas boundary and diagnostic controls provide a feedback control orientation shaping team's behaviors in the same direction. Moreover, the team's beliefs MCS, induced by diagnostic, interactive, and boundary MCS, considering feature development as a team's highest priority, dominate the effects of the external beliefs MCS pushing a team toward broader knowledge. In fact, the latter were just sustained by longer feedback loops. Despite its exploratory nature, this paper has interesting managerial implications, revealing the nature of the MCS stemming from the agile implementation and their effect on team's learning processes. This awareness could be useful to adopt suitable levels of balanced ambidexterity (Gibson and Birkinshaw 2004), allowing R&D managers to employ control systems to 'dynamically' shift from exploitation to exploration (McCarthy and Gordon 2011). To conclude, this study represents one of the first contributions on the theme of MCS in agile development projects, and it informs existing theory by offering an empirical validation of Simons' (1994) MCS taxonomy, that resulted to be suitable for exploring management controls also in an agile context. Constituting only a first step in this direction, it is obvious that more research is needed to understand the broader impact of different MCS in organizations adopting agile methods of working, and then, in particular, its long-term effects.

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# 12

# Improvising Agility: Organizations as Structured-Extemporaneous Hybrids

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## 12.1 Introduction

It is now accepted that organizations compete in hyperbolic, spectacularized markets (Flyverbom and Reinecke, forthcoming), and that being hypercompetitive (D'Aveni 1995) poses important demands in terms of

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the organizational capacity to respond accordingly. Research similarly shows that competitive advantages are increasingly hard to sustain (Wiggins and Ruefli 2005). This has led authors to defend that if environments do not stand still, then organizations have to become more agile, even super-flexible (Bahrami and Evans 2011). The notion of agile management became popular in software development, but the hyperbolic demands abovementioned turned it relevant also for other sectors and industries (Rigby et al. 2016). The idea of agile management is that to survive in markets that change relentlessly (Brown and Eisenhardt 1997), organizations need to devise and to rigorously implement several strict mechanisms (e.g., Schwaber 1997) that directly challenge decades of organizational perfecting. Such agile processes must involve the "whole organization", setting all levels, unities, and functions in a permanent "conversation" with the marketplace (Gothelf 2014). Therefore, being agile represents an organizational hybrid, a paradoxical combination of structure, and extemporaneity.

Management has traditionally been about control and hierarchy, yet control and hierarchy mindsets are not responsive enough to markets that keep on changing (Cunha et al. 2011). However, paradoxically, to face environmental instability, organizations have to depart from the organic forms and incorporate components of the mechanistic approach (e.g., Burns and Stalker 1961). This tension between the organic and the mechanistic demands has consequences. As the chapter will discuss, the search for agility and readiness expressed by the agile philosophy entails striking a balance between order and improvisation. That recalls the idea of self-organizing as "camping on seesaws" (Hedberg et al. 1976). Specifically, under the current pressures, organizations are being urged to experiment with new forms, such as the holacracy (Bernstein et al. 2016; Robertson 2015) and to approach their markets through improvisation (i.e., the deliberate fusion of the design and execution of a novel production; Cunha et al. 2017).

In this chapter, we discuss agility as a partly improvised product conducted by improvisational leaders, i.e., leaders that approach and define rules that guide behavior in normal conditions and that stimulate impromptu adaptations under unpredicted conditions, when the existing rule set collapsed. While agile management emphasizes the peer-to-peer side of social interactions and the mechanisms for self-organizing, we posit that leadership still plays a crucial role in its enactment (Hall and Rowland 2016). More specifically, we consider three elements of the process of improvisation: leaders, followers, and contexts (structures/cultures). To this extent, the chapter illuminates that leadership is needed even in organizational forms designed to rely on self-organizing and team-based mechanisms (Beck et al. 2001). We adopt a relational (Uhl-Bien 2006) and distributed leadership (Edmondson 2012) perspective by exploring improvisation as a mutually constructed process of supportive leaders, compelled followers, and a conducive context. This improvisational triad, however, is fragile, and the lack of the right contribution from any component will potentially project negative implications for the construction of agile organizing.

With the above goals in mind, we structured the chapter as follows. We start by articulating agility, improvisation, and organizing. Next, we discuss improvisational leadership through the conceptual lens of core agile principles. Before closing, we discuss obstacles to agile improvisational leadership.

## 12.2 Agility *and* Improvisation in Organizing

As Rigby et al. (2016, p. 42) have pointed out, "agile innovation methods have revolutionized information technology." Originally, agile methodologies have been applied to software development and IT contexts, but they are currently being explored in other contexts and industries as well. Agile became a sort of a buzzword and some key practices, such as Scrum, *Kanban*, and lean development attracted significant attention. It is possible, however, to represent "agile" as a mindset, more than a set of practical principles or tools (e.g., Lee and Xia 2010; Schwaber and Beedle 2001). Both agility and improvisation are relatively new concepts in the field of management and organization whose interception has not been addressed, at least explicitly. The aim of this chapter is to mingle them to benefit from conceptual cross-fertilization. Our departing point is the observation that the two topics have significant overlaps yet they remain theoretically distinct.

### 12.2.1 Differences

*Agility* refers to "moving nimbly, with a sense of urgency" (Bahrami and Evans 2011, p. 25). Organizations can move nimbly via planning, meaning that they can plan to be nimble, which means that it is possible to express agility in the absence of improvisation. The very adoption of agile methodologies constitutes an example of this possibility: organizations adopt agile approaches to gain agility. *Improvisation* refers to the deliberate fusion of the design and execution of some novel production (Cunha et al. 2017). Improvisation involves some "mixture of the pre-composed and the spontaneous" (Weick 1998, p. 551). What is distinctive of improvisation is that it is a complement of planning and routine, not its substitute (Cunha et al. 1999). Organizations improvise when their plans are insufficient or inadequate to deal with reality, but improvisations are not sequences of ad hoc actions.

Sometimes, research on agility and flexibility assumes that the process is especially important for those organizations that compete in so uncertain and unstable environments that they strive to remain "forever adolescent" (Bahrami and Evans 2011, p. 21). Such a phenomenon has been investigated in project-based forms, in which project overload, little time for reflecting, learning, and recuperation between initiatives (projects) might affect maturity (of knowledge) and learning (Bredin and Söderlund 2011). This claim is not *so* central to improvisation scholars, who even defend that improvisation may occur in stable competitive environments (Hodgkinson et al. 2016). The field of improvisation has shifted from the study of the process as mostly associated with innovation to the importance of improvisation in mature organizations. Recent research on the topic highlights the fact that routines are a duality, in the sense that they incorporate the potential for stability *and* change. However, the duality of routines and its potential to support organizational renewal is important to more mature industries such as retailing (Sonenshein 2014, 2016).

### 12.2.2 Similarities

The two concepts also share several properties, such as the fact that agility establishes as one of its core values that responding to change is more important than following a plan. This is compatible with the practice of improvisation. Therefore, both concepts represent an alternative to the planning/executing approach (Vidgen and Wang 2009). Additionally, agile methods expect people to reach a level of mastery that will allow them to get to a stage in which they "so thoroughly absorbed the laws and principles that they are free to improvise as they choose" (Rigby et al. 2016, p. 46).

Both agility and improvisation thus emphasize the importance of real-time adaptation; agile scholars often assume that to increase agility organizations need to develop "reflexive instincts", the capacity to act *in situ*, and the skill to "improvise quickly" (Bahrami and Evans 2011, p. 23). The two concepts also highlight the fact that cultivating agility corresponds to a delicate balancing act, an exercise in organizational dialectics (Bahrami and Evans 2011, p. 24; Clegg et al. 2002). The two concepts (excluding the practice of individual improvisation) also rely on teams and team working (Hadida et al. 2015; Nerur and Balijepally 2007). They require ongoing *teaming* (i.e., "teamwork on the fly") and "distributed leadership" that nurtures or facilitates such a process (Edmondson 2012).

To some extent, the combination of agility and improvisation respects Ashby's Law, stating that "only variety [of internal behaviors] can destroy variety [related to the external instability]" (Ashby 1956, p. 207), as the condition for dynamic stability under perturbation. In this vein, agile methodologies are about "feedback and change" conceived to embrace, rather than reject, higher rates of change (Williams and Cockburn 2003, p. 39). Considering the similarities between the concepts, we now articulate improvisational leadership and the core principles of agility (Beck et al. 2001; Rigby et al. 2016).

## 12.3 Improvisational Leadership Through Agile Principles

Rigby and his colleagues (2016) identified four core agile values and principles: (1) people over processes and tools, (2) responding to change rather than follow a plan, (3) working prototypes over excessive documentation, and (4) customer collaboration over rigid contracts. These principles, we defend, are highly aligned with an improvisational understanding of leadership. In this section, we discuss each core principle by reference to leadership as the process of social influence involving *leaders*, *followers*, and the *context* (Kozlowski et al. 2016). The three elements are intertwined and influence each other (e.g., followers and leaders create and are created by the context). We select three possibilities per topic, not because they exhaust the discussion but because they offer a clear view of leadership work at the boundary of agility and improvisation (Table 12.1).

### 12.3.1 Principle 1: People Over Processes and Tools

**Leaders.** Leaders can put people over processes or tools in three different ways. First, they need to create shared organizational realities. One important reality to share should precisely establish the prevalence of people over process. It is common to defend people as the main source of competitive advantage, with good arguments (Pfeffer 1994), but very often the practice indicates otherwise. The capacity to establish the values of agility through improvisation necessarily lay upon the belief that people can mold the organization and that the organization trusts that their change attempts will be well-intentioned and responsible (Cleveland et al. 2015; Goffee and Jones 2013). Putting people above processes means that people should not be afraid to correct and change processes (Deming 1986) and to assume, and learn from, mistakes (Edmondson 2012; Edmondson and Lei 2014). The capacity to improvise with and around the processes (Sonenshein 2016) means that people own processes rather than the other way around. Processes are thus open to change by people.

**Table 12.1** Improvisational leadership and the cultivation of agile principles

| | Leaders | Followers | Context |
|---|---|---|---|
| People over processes | • Create shared realities<br>• Align teams via peer-to-peer approaches<br>• Lead with questions | • People as organizational citizens<br>• Allow positive deviance<br>• Assume positive assumptions | • Problem solving orientation<br>• Organization as community of work<br>• High road type of HRM |
| Respond to change rather than follow plans | • Clarification of purpose<br>• Empowering leadership<br>• Simplifying structure | • Employees as organizational citizens<br>• Perception of personal accountability<br>• Sense of psychological safety | • Change orientation<br>• Living company mindset<br>• Celebrate small wins |
| Working prototypes, not excessive documentation | • Represent rules as processes<br>• Stimulate discussions around data<br>• Ask why and allow others to do the same | • Turn employees into change agents<br>• Favor direct conversations over formal communication<br>• Embed variation in everyday work | • Culture of experimentation<br>• Nodal architectures<br>• Enabling structures |
| **Customer collaboration over rigid contracts** Customer collaboration over rigid contracts | • Create proximity to clients<br>• Present contracts as processes<br>• Diffuse collaborative stories | • Use proximity to customers to spot opportunities<br>• Create X-teams<br>Stimulate pro-social motivations | • Cultivate planned opportun ism<br>• "Yes-anding" cultures<br>• Institutionalize collaboration through cultural work |

Second, leaders may align teams via peer-to-peer approaches. Putting people first to increase agility is also accomplished through mitigating the power of hierarchy and reinforcing the power of mindful approach to problems and relational forms of coordination (Gittell and Douglass 2012). Such an approach requires intense collaboration in peer-to-peer cultures, i.e., in cultures that represent the hierarchy as a tool rather than as the channel for communication. Agile methodologies such as Scrum are based on the "inspect and adapt feedback loops" that are set up to face complexity. In particular, project complexity is broken down into short work cadences ("sprints"). The "Sprints" pace peer-to-peer interactions through which leaders create conditions for collective improvisations, as improvisations depend on the existence of mutual awareness and shared understandings, namely with regard to the conventions of improvisation itself (Kamoche et al. 2003).

Third, consistently with the peer-to-peer logic of agile management, leaders may lead with questions, by "destroying variety with variety" (Ashby 1956). By leading with questions (Marquardt 2014; Zenger 2016) leaders adopt a coaching orientation that fundamentally diverges from more traditional command and control approaches. Leading with questions (a) means that leaders do not treat people as *subordinates* but as members of the organization, and (b) allows managers to stimulate reflection and to avoid the imposition of their points of view that would, at the end, disconfirm the assumption that people are an important asset. Important assets should be liberated rather than guarded or coerced. It is certainly by more than coincidence that coaching features are so saliently in the characteristics of good managers in organizations such as Google (Garvin 2013). Good questions can potentially lead people to think with and about the rules and to stimulate experimenting with them rather than to see them as determined and closed.

**Followers.** The above practices may contribute to develop followers inclined to see themselves as being above processes. First, if the above principles are consistently applied, it is possible that employees develop a better self-concept, including the view of themselves as organizational citizens (Manville and Ober 2003; Parker 1997). As organizational citizens, people have responsibilities and rights and the role of the organization should be supporting them to fulfill their potential and, in the process, to contribute positively to the organization itself. Citizens can improvise their own solutions; vassals obey, they do not and cannot improvise.

Second, applied consistently, the rules of citizenship can lead to positive deviance. Engaged citizens will sometimes go to great lengths to do whatever they consider right, even if it requires a dose of creativity that goes against the rules (Mainemelis 2010). This is the case of active followership (Carsten et al. 2010), which is characterized by personal initiative, often reflected in a willingness to challenge the status quo, and identify and voice potential problems and solutions. Existing improvisational literatures also explains that sometimes people improvise under the organization's radar (Cunha et al. 2015), but in other cases, the organization frees employees to initiate improvisations that can lead the organization in unexpected directions. This happens as people respond to situations that they frame in ways that diverge from the organization's formal perspective. Agility requires motivated individuals (Rigby et al. 2016) and motivated people can actively pursue their motivations even when these are orthogonal to what the organization envisions—the promise, of course, contains peril, as evidence demonstrates, in some cases in a spectacular way (Giustiniano et al. 2016).

Third, followers will potentially accept the idea that they are above processes when the organization projects positive assumptions and expectations toward them (Heynoski and Quinn 2012), and discovers and magnifies the followers' strengths (Goffee and Jones 2013). Improvisation necessarily involves deviation, openness to error and surprise, as well as a culture of agility. Improvisation can only be sustained when these elements are represented positively. Common organizational assumptions constitute an obstacle to the adoption of practices that extensively rely on trust and relational coordination, such as agile management. As such, agility through improvisation assumes that people will be interested in creating the best possible conditions for the organization. Research shows that assumptions often create reality via self-fulfilling prophecies (Adler 1993; Merton 1948) and that, as such, improvisation demands a mutuality of positive expectations. Differently, when people live under "normal" assumptions (where employees are seen merely as "employees" instead than as "humans at work", Cleveland et al. 2015), then being agile and improvising potentially constitute dangerous ideas.

**Contexts.** Some contexts are more favorable than others with regard to a problem-solving orientation (Hargadon and Bechky 2006; Tyre and Von Hippel 1997; von Hippel and von Krogh 2015). First, some organizations prize compliance and conformity whereas others propend toward tackling problems as they manifest (e.g., Eden and Radford 1990). The former has a preference for conformity and predictability, whereas the latter see perturbation and responsivity as characteristic of a viable system. Contexts put people above tools when they appreciate voice and proactivity (Grant and Ashford 2008), thus creating a climate that reinforces and calls for such behaviors. On the contrary, when proactivity is perceived as disruptive and negative, it is likely that conformity and strict obedience will ensue. The organizational power circuitry (Clegg 1989) will be well defined and the organization will channel its decision flows through it rather than against it.

Second, organizations show that people are above tools/processes when they create a sense of community (Cleveland et al. 2015; Kets de Vries and Florent-Treacy 2002; Pfeffer 2010). The notion of a psychological sense of community (Burroughs and Eby 1998) is critical for agility to emerge as it nurtures the necessary sense of perceived organizational support (Eisenberger et al. 1990). Finally, organizations prove that people are at the heart of the organization when they practice high road HRM strategies (Gittell and Bamber 2010). These practices materialize the discourse and stimulate organizational engagement. If, as Rigby et al. (2016) pointed out, agile projects are built "around motivated individuals" (p. 44), adopting high road HRM strategies is crucial for those organizations that aim to construct agility through improvisation.

### 12.3.2 Principle 2: Respond to Change Rather Than Follow a Plan

Plans are important to establish direction (Beck et al. 2001), to support the development of routines (Feldman and Pentland 2003) and, thus, to construct *organization* (Mintzberg 1987, 1994), but plans should not impede learning and adjustment. The planning process, i.e., a product concept (Andrews 1980), is an important organizational activity, but planning is more fruitful when it stimulates learning and adjustment (Mintzberg 1994) rather than when it is understood as an organizational sacred cow. Learning is, by definition, attached to the idea of change in knowledge and skills in a relatively permanent process (Weiss 1990). It is, in this sense, that organizations can construct their plans and the routines they require, but then represent them as sources of adaptation and tools for exploring as well as for exploiting (Piao and Zajac 2016), paradoxical tools.

**Leaders.** Leaders play a fundamental role in stimulating rapid responding through improvisation. They can do so by clarifying purpose, empowering, and simplifying the structure. First, responding to change rather than following plans is more likely when people know *why* they do some task. A clear and meaningful purpose allows people to understand their jobs deeply (Cunha, Gomes, Mellahi, Miner, and Rego forthcoming), to craft them (Wrzesniewski and Dutton 2001), and to adapt their roles to the changes around. Even routine jobs, under these conditions, can be approached more mindfully and stimulate improvisation. Second, leaders can support flexibility by empowering people. A sense of autonomy and empowerment is fundamental for people to initiate improvisation (Magni and Maruping 2013; Nisula 2015). Such as argued by Maynard et al. (2012, p. 1273), empowerment is "competitively advantageous—especially when paired with a highly skilled and motivated workforce operating in dynamic environments." Third, these improvisations necessarily take place inside clear structural limits. Establishing limits without stifling autonomy is important to create agility (Cunha et al. 2009; Kamoche and Cunha 2001).

**Followers.** Followers respond to change rather than stick to plan and routine when, first, they perceive themselves as organizational citizens (Manville and Ober 2003; Parker 1997). In this case, an organizational problem becomes *their* problem, which increases the likelihood that problems will not be approached bureaucratically. Second, responding to change rather than following plans is also more probable when employees feel accountable for their actions (Edmondson 2008), in the sense that rules are not perceived as excuses for inaction or mindlessness. Finally, followers will be more willing to respond to change if they trust that they feel psychologically safe (Edmondson and Lei 2014), where they can engage in risk taking and trial-and-error learning without fear of rejection or embarrassment. When escaping the safety of plans, people will expose themselves to the possibility of mistakes. If the context is not friendly to an aesthetics of imperfection, then people will potentially be less inclined to improvise. Being agile can be tricky when the organization is inclined toward zero-defect types of environments. People's interpretations of context do matter.

**Contexts**. Some contexts are friendlier than others for responding to change, for three reasons: they adopt a change orientation, they are pervaded with a "living company" mindset, and they celebrate small wins. First, they incorporate the change in organizational processes. In other words, they educate people to see change as part of the daily life. In this way, there is a state of readiness to change (Armenakis et al. 1993) that frames change as normal rather than exceptional (Weick and Quinn 1999). The ordinariness of change means that anyone is a change agent and that therefore she/he can respond to change needs in ways not predicted by the hierarchy. These organizations correspond to "living companies" (De Geus 1998). In these companies, change is seen as vital for the organizational renewal rather than a threat to be controlled or neutralized. Instead of seeing changes initiated at the base as a source of potential problems, they welcome them as signals of the good health of the system. An employee improvising to respond to the unique request of a customer should be taken as good rather than bad (Cunha et al. 2009). Some companies even inscribe the stories that express the organization's living culture in institutionalized mechanisms, in order to present the culture as a living and friendly to flexible responding rather than as a crystallized set of values. Finally, by celebrating small wins, organizations build the psychological capital (at both the individual and collective levels; Luthans et al. 2017) and consolidate gains in change while energizing perseverance toward long-term goals.

### 12.3.3 Principle 3: Working Prototypes Over Excessive Documentation

The third principle is the cornerstone of the lean startup model, where experimentation, customer feedback, and multiple iterations are favored over planning, intuition, and traditional business models (Blank 2013). Interestingly, while the model was developed mostly to help new ventures accelerate their growth, it has also been applied in corporate settings. For it to work, organizations must pay attention to three elements (Garvin and Levesque 2006): develop a strategy by trial and error, balance operational experience with the invention, and integrate new practices with autonomy.

**Leaders.** Leaders can enact this principle, first, by representing rules as processes. Instead of seeing rules as crystallized commandments, considering them as processes (or "guidelines") invite people to be mindful and to change rules when new rules are deemed necessary (Edmondson 2008; Takeuchi et al. 2008). Instead of representing rules as absolutes, they are perceived as temporary accomplishments, compatible with a process approach. This is not to say that every rule is relative: some rules can be absolutes (Sonenshein 2016), but even absolutes can be replaced by superior absolutes. Second, leaders may stimulate discussions around evidence (e.g., Pfeffer and Sutton 2006). Data offers evidence that will enrich interpretation. Combined with the above ingredients, data will lead people to try improvisations as learning experiments (Duhigg 2016). Finally, one reason people respond with agility can result from the fact that data will invite them to ask *why* and allow others to do the same. If leaders consistently allow people to ask *why*, they will be reinforcing the idea that people matter and that rather than looking for someone to blame (*who*), the organization wants to focus on *what* can be done after an error has occurred (Frese 1991).

**Followers**. The above practices will, in turn, impel followers to put working prototypes over excessive documentation. First, those practices stimulate the representation of employees as change agents. Change agents need documentation but they perceive the knowledge contained in documentation as temporary. Instead of focusing on the documentation, they concentrate on prototypes of products or processes as paths to gain more knowledge. Prototyping around evidence can allow people to make discoveries, to untap new forms of knowledge that can lead to improvisatory deviations, to cultivate real-time experiments around adaptation and other practical approaches that may increase agility by unfreezing habits and mindless approaches (Duhigg 2016). Second, as Duhigg's example with credit recovery professionals illustrates, these prototypes can be more successful in case the organization favors direct conversations over formal communication (Heynoski and Quinn 2012). Finally, variations would thus be embedded in everyday work, becoming ordinary expressions of change rather than moments of extraordinary revelation.

**Contexts**. Contexts may favor the prototyping principle in three interrelated ways: (1) a culture of experimentation is facilitated by (2) enabling structures and (3) nodal structures. Contexts contribute to favor prototyping over documentation when they stimulate cultures of experimentation, characterized by a disposition to consider work routines as temporary and imperfect and therefore amenable to improvement (Sonenshein 2016). This disposition can counter the representation of rules and routines as prepacked "one best ways" that should not be altered. Understanding them as inviolable in principle can lead to their respective transformation into coercive structures (Adler and Borys 1996). Enabling structures, as an alternative to coercive bureaucracies (Adler and Borys 1996) are, instead, perceived as open to experiments. Experimenting with and around the rules is critical to impede them from fixing and ossifying. In this way, instead of viewing structure as a hierarchy that is fixed, agile organizations stimulate people to take the organization as a nodal structure (Bahrami and Evans 2011). A nodal, multipolar view of design invites organizations to perceive structures as fluid, temporary, changeable, and dispersed. The structure, in this sense, is the strategy (Roberts and Eisenhardt 2003) as different nodes can be activated to respond, via improvisation, to different problems, in a highly flexible way, in the absence of planning.

### 12.3.4 Principle 4: Customer Collaboration Over Rigid Contracts

This principle is feasible as the idea of "closeness" characterizing the neoclassical interpretation of contracts is progressively vanishing. In modern times, co-design of solutions is customary in many provider/supplier schemas and communication technology enables rapid feedback exchange. Customers, therefore, become active protagonists of process progress rather than receivers of fixed solutions.

**Leaders.** Leaders can put collaboration with customers over contracts in several ways. First, by creating proximity with them. Proximity with the problems and perspectives of clients potentially lead people to empathize and to devise new ways, some of them improvised, to respond to customers (Kim and Mauborgne 1991). Proximity to the client can be a source of creative ideas, some of them invented on the spot to respond to problems. Second, this approach can be reinforced by seeing contracts as processes (i.e., constantly open to adjustment and renegotiation) instead of fixed agreements. Handy (2011) called these contracts-cum-processes "Chinese contracts". Third, the diffusion of collaborative stories validates and strengthens the inclination to improvise in response to customers. The "wow" stories at Ritz Carlton (Michelli 2008) incorporate a dimension of improvisation: because special customer needs are unpredictable, offering a great service necessarily involves the availability to do what needs to be done when it needs to be done.

**Followers.** Customer proximity can, in turn, be used to spot opportunities. The episode that conducted to the discovery of Tolvon by Organon offers a good example. It was the proximity of a gate keeper (literally, in this case: a secretary; see Day and Shoemaker 2008) that allowed the redirection of an experiment that proved very lucrative. Proximity to customers can thus be necessary to detect opportunities for the sort of "planned opportunism" (Pettigrew 1990, p. 274; Govindarajan 2016) that conflates improvisation and agility. Because agile depends on team work, the creation of X-teams (Ancona et al. 2002), i.e., teams richly connected to their ecologies, becomes of particular importance. This will facilitate the circulation of knowledge, enrich social capital (Nahapiet and Ghoshal 1998) and potentially allows improvisational individuals and teams to work with a perception of social support. In addition, as evidenced by Grant (2008), working with a pro-social motivation is a source of engagement and possibly of the motivation to improvise, in order to respond to the expectations of others.

**Contexts**. Cultivating cultures of planned opportunism can invite people to represent their work as potentially improvisationally rich. Being opportunistic in a planned way allows people to incorporate improvisational opportunities as part of their job crafting (see principle 2). Being responsive to customers means not only to follow what is contractualized but also what can be done to expand the nature of the contract in favor of the relationship. This can be further developed by nurturing “yes-anding” cultures (Leonard and Yorton 2015), informed by improvisational training. Instead of blocking communication inside contractual terms, people use relationships to expand possibilities. The application of improvisational techniques can be practiced and perfected as a skill rather than as a natural instinct. The adoption of yes-and mindsets can subsequently be used to affirm the logic of collaboration. The institutionalization of improvisation as a legitimate organizational practice can inscribe collaboration in the repertoire of organizational actions, creating space for more improvisations to unfold.

## 12.4 Boundaries of Agile Improvisational Leadership

Agile organizing through improvisation is easier said than done. We anticipate several obstacles that might limit the ability to enact agile improvisational leadership. First, organizations are naturally inclined to adopt the hierarchy as the right way to get things done (Fairtlough 2005), such an inclination running against the adoption of the principles discussed here. Nonetheless, bottom-up processes of leadership (i.e., followership turned leadership; Carsten et al. 2010) have gained momentum. Second, it seems plausible that the principles discussed here will come as more appropriate for organizations in some sectors than others (e.g., agility may seem much so for a software developer but not so obvious for an insurance company). It can be, however, a matter of degree. Some organizations, given the nature of their activity, may need more formality and bureaucracy than others; but even bureaucracies are compatible with improvisational efforts to respond adequately to their environments. As pointed out by Rigby et al. (2016), agility is not about anarchy; the same is valid for improvisation.

Third, leading and following at the boundary of structure and extemporaneity demands significant levels of skill and maturity. There is a demanding learning journey before reaching improvisational skills to be deployed through agile organizing. In many organizations, it is possible that a significant part of the workforce does not possess enough competences for improvisation. From the leadership side, improvisation, and agile involve a dialectical component. Dealing with the contradictions of agile improvisation requires leaders to express paradoxical competences to use oppositions fruitfully, hybridizing seemingly opposites and sustaining them over time (Smith et al. 2016). These are difficult to garner. Therefore, many organizations may lack the leaders they need to articulate the tensions of agility and improvisation. Finally, we mentioned the importance of positive assumptions and an engaged workforce. These may be in short supply. So-called normal organizations are normal because of their prevalence, as confirmed by global evidence (Gallup 2013), not because they are a model to follow.

## 12.5 Conclusion

To build agility, managers can benefit from acting as improvisational leaders, articulating structure and responsiveness in a way that allows organizations to take advantage of stability and flexibility as two sides of the same coin. We articulated the literature on improvisation and agile management to indicate possible areas for cross-fertilizing an organizational hybrid. It is now time to test these ideas empirically to know more about when and how improvisational leaders contribute to create more agile organizations.

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# 13

# The Emergence of New Organization Designs. Evidences from Self-Managed Team-Based Organizations

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## 13.1 Introduction

To survive in global markets and respond to increasing customer demands, firms must combine high quality and low costs while developing new products. In order to meet these targets, a growing number of firms

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have undertaken the conversion to a post-bureaucratic structure, transforming hierarchically based organizations into flatter organizations of self-managed teams (e.g., Foss 2003). In doing so, firms must cope with coordination issues, since they need to ensure that teams and people collaborate effectively with other teams as well as within their own team. Self-managed, team-based organizations look like biological super-organisms, a mass of individual entities that exist together, cooperate, and evolve together via an intricate set of symbiotic and reciprocal relationships forming a larger organism (Tautz and Heilmann 2008).

The open and peer-based nature of self-managed teams renders the traditional logics of control, hierarchy, formal roles, and pecuniary incentives considerably outdated (e.g., Annosi et al. 2015). In team-based organizations, the formal authority exercised by managers is replaced by the informal control enacted by peers inside the teams (Barker 1993), and by informal authority based on the expertise, reputation, status, gatekeeping privileges, or control over crucial resources or technology (Blau 1964). Thus, the core ability of the organization to direct people and teams is not just related to its formal authority system, but also the bargaining power that different organizational entities may exercise over teams and employees, which may be derived from any asymmetric dependence (Gulati and Sytch 2007).

This multiple sources of authority introduce serious challenges to the design of new organizational forms. People in teams and in the organization may be exposed to formal and informal sets of rules (North 1990), which are strictly connected to diverse logics at the team and organizational level.

So far, the institutional theory has paid little attention to the analysis of the creation and development of new organizational forms (Suddaby and Greenwood 2005). We analyze new organization designs in order to discuss how self-managed teams in firms solve coordination problems. More specifically, we observe new organization designs established by a transition from traditional, planning-intensive, and linear product development approaches to more iterative and self-organized approaches inspired by Scrum methodology (Schwaber 1997). We conduct our study in a multinational organization in the telecommunication industry that has struggled to combine two conflicting logics: that of efficiency and productivity are driven by the Scrum framework, and the logic of long-term goals needed for firms' survival, such as learning and innovation. In doing so, this multinational form has integrated elements of both logics into the newly established organization design and strove to make it an accepted approach to cope with a balanced strategy.

## 13.2 Methods

### 13.2.1 Empirical Setting: Agile SCRUM

Scrum is one of the most common Agile methods (Dingsøyr et al. 2012). The Scrum development process was originally proposed by Schwaber (1997) and is arguably based on the product development methodology described in Takeuchi and Nonaka (1986). In this methodology, a new approach to commercial product development was introduced to increase speed and flexibility.

Scrum brings decision-making authority to the operational level by leveraging self-managed teams. The Scrum development process as proposed by Schwaber (1997) comprises various ceremonies which self-managed teams have to respect. More specifically, teams are expected to attend:

- sprint planning meetings to determine a list of prioritized features for the team;
- daily Scrum meetings, focusing on what each team member accomplished the day before and should accomplish today;
- demo meetings where the team shows what was completed during the sprint;
- retrospective meetings, aiming to reflect on how the team is doing and on finding ways to improve.

We conducted our study within three R&D divisions, employing 550 people overall, within the same Multinational Firm. Each unit actively participated in the study in order to get feedback and suggestions on the strengths and weaknesses of agile methodologies.

This large firm, which has a reputation for product and innovation management, operates in the Telecommunications Industry and the R&D Units all shifted to software development using Agile Methodologies (mainly Scrum, adopted by 400 employees on 15 different development projects) in mid-2011. These units appear to be a suitable setting in the light of: (i) the existence of a common control system and organizational structure, as well as a common set of values and organizational culture, which reduces the risk of dissonance; (ii) the volatile environment in which they operate, as it forces them to adapt to environmental instability while remaining focused on time to market to prevent any impact on performance.

Data collection spanned a six-month period (November 2012 to April 2013). From mid-2011 to November 2012, and therefore in the 18 months preceding our study, Agile was implemented uniformly across the units, reorganizing employees into self-managed teams, and no exceptional technological change took place.

Teams resulting from the Agile transformation were cross-functional, and included designers, testers, software architects, and system managers. The main tasks were related to the development of new product functionalities, with the aim of creating efficiency, while fostering learning and collaboration. All team members shared goals, backlog, and common conditions for handling highly interdependent tasks.

### 13.2.2 Data Source and Analysis

We combined different data collection methods and sources to increase confidence in the accuracy of findings (Jick 1979). More specifically, we conducted an extensive archival data research, multiple (17) group interviews, and repeated semi-structured interviews with key informants (executives) of the focal R&D units. All interviewees remained anonymous. At the same time, we attended different team and firm events for direct observation, made follow-ups through emails, phone calls, and observations, and obtained 65 texts from secondary data sources, such as archival data extracted from project and organization publications. We initially conducted individual, pilot interviews with

Managers, Top Management Team (focusing on the unit head and the head of R&D), innovation coaches. The initial goal of our research was to reach an understanding of the issues arising from the adoption of Agile, as it was clear that the firm was experiencing a reduction in the number of patents, product ideas, and system improvements for which the Top Management Team appeared to blame the implementation of Agile methods. On the other hand, while at the product level innovation seemed to be experiencing a slow-down, process improvement, and innovation were greatly stimulated by the agile way of working. In this regard, we also performed a two-hour workshop with middle and senior managers to cross-verify perceived barriers to innovation and the nature and root cause of the predefined organizational identity.

These meetings were a source of information on innovation behaviors and learning events, and helped us to frame the extent to which the organization was investing in process and product innovations and to prepare our second round of interviews. These were performed with line managers, team members, scrum masters (ScM), product owners (PO), and systems managers for each of the R&D units. During these 60–90 minute interviews, which were recorded and reviewed within 24 hours, we covered a wide range of issues, including the firm's portfolio-formation activities, the organizational design in place, the strengths and weaknesses of the new organizational design, the organizational routines adopted to transfer knowledge among teams, and to enable self-reflection and learning and finally, the perceived barriers to innovation. We also included 17 closed-ended questions to a subset of the interviewees in order to collect specific factual information (e.g., dates, events, managers involved, issues discussed, deal terms). We undertook direct observation of a software development process, within two of the three units, in separate visits lasting three days each.

In order to deal with biases and draw a complete and accurate picture of the phenomenon (Kumar et al. 1993), we collected data over a period of 5 months, in successive phases involving multiple hierarchical levels and different functional areas. All the informants were informed about the organizational design, the structure, and the problems, and at the same time could disclose part of the organizational culture, identity, and logics. Finally, we combined different data sources, more specifically, interview data with archival data (the secondary data sources and the observational data).

### 13.2.3 The Organizational Setting

In order to pursue both efficiency and innovation as strategic goals, two parallel organization designs were applied in the organization with little integration between them. The organization design for executing productivity and efficiency strategies was implicitly driven by the adoption of Scrum framework implying a constant monitoring of teams' performances and work progress. The design for efficiency resulted in the co-existence of different team stakeholders becoming the structural differentiation principle applied-entities at the same level concentrated on certain aspects of the inclusive higher order strategy. In such a case, we observed an extension of the line/project managerial roles (Bredin and Söderlund 2007) with the co-presence of further responsibilities surrounding teams. For example, the ScM focused on the team's adherence to agile practices and had little tolerance for any deviation from the plan. Line managers focused on motivational aspects of individuals inside the team and on the competence needed for project-development activities. POs focused on prioritizing the work to do inside the teams and transferring the requirements towards the teams. Those responsible for certain features were in charge of controlling any macro deviations in the teams' performance and for removing any potential impediments to the smooth implementation of activities. Stakeholders, to various extents, were devoted to spreading agile practices and values, and directing the transformation to agile practices.

This dense stakeholder network was implemented to efficiently monitor the actions of the team and to put pressure goals and move toward conformity. On the other hand, the network of innovation coaches, which appeared less dense, had the aim of directing product innovation and posed a more discrete pressure as it exhibited a limited ability to monitor team behaviors or to create behavioral norms (Fig. 13.1).

As stakeholders showed multiple and consistent influences, teams were not always able to meet the expectations of their innovation

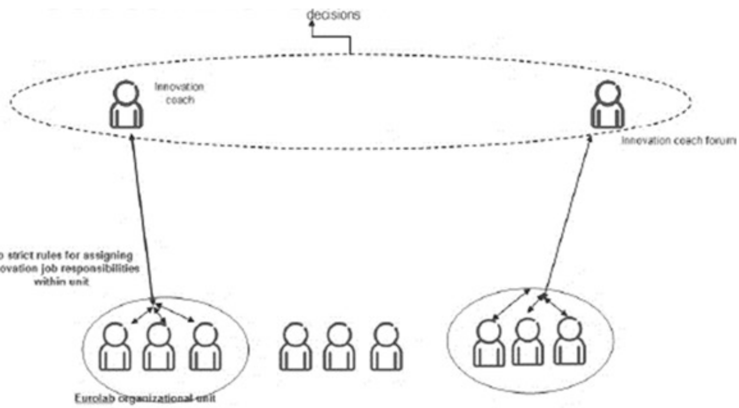


**Fig. 13.1** Networks of the innovation coaches

coaches, as accomplishing certain goals could deviate from the expectations of the other project stakeholders, resulting in an underperformance in product innovation tasks.

Additionally, the life of each team was regulated by performance loops, such as: daily meetings (involving ScM, PO and line manager) in which team members had to report their own progress to the team, exposing themselves to daily performance feedback concerning the attainment of project goals; in every bi-weekly sprint review meeting, teams showed PO what they accomplished; during retrospectives, the ScM received group performance feedback in order to inspect and adapt Agile methods and teamwork, thus enabling overall team learning, acting as a catalyst for change, and generating action; team performances were collected and monitored by the line organization to verify the adherence to the above-mentioned organizational goals in order to react in case of deviations.

## 13.3 Findings

The comparative analysis of the three R&D organizations permits the identification some forms of organization design which departed from the company's expectations. The extant evidence on the implementation of the Scrum methodology permits the delivery of "faster, better, and cheaper solutions" (Dybå and Dingsøyr 2008). To this extent, the domain of software development management becomes the wider framework for product development, embedding market-driven requirements, and interdependencies (Vlaanderen et al. 2011). Because of its scope, it is expected to shape the relative organizational settings significantly. Our findings show that even when done "by the book", the implementation of the Scrum methodology might generate some unexpected results. Some of them have a direct effect of organization design, encompassing micro and meso-levels, while some others can be localized more easily.

### 13.3.1 Micro-Level Effects

As anticipated, the adoption of Scrum is driven by two conflicting logics: first, efficiency and productivity, and second, innovation and learning. The main problem we observed is related to an actual shift of focus from insistence on the short-term issues.

Data shows that people keep on generating new ideas on how to improve the processes while only a few focus on product innovation. Table 13.1 reports the evidence of a workshop conducted with middle and high-level managers, aimed at understanding the state of play as to the implementation of Scrum as well as at assessing the balance between short-and medium-and long-term goal orientation. On the evidence which emerged from the interviews; individuals did not have a clear picture of the reasons for such negligence on product innovation. Nonetheless, "time pressure" was elicited as the main factor justifying this major concern over efficiency and productivity.

### 13.3.2 Meso-Level Effects

The analysis of the organization design of the teams was aimed at shedding some additional light on the co-existence of the two logics. The analysis concentrated on the "ideation" phase and took into consideration the horizontal and vertical knowledge flows, as well as how the

**Table 13.1** Extract of the guidelines of the workshop with managers

| Construct development from preliminary qualitative data-main emerged concepts | Organizational expectations from two hours' workshop with main organizational stakeholders |
|---|---|
| Process and Product innovation performances | Get practical hints on how to innovate in parallel to agile way of working<br>What is meant by innovation? Process? Product?<br>Assumptions on outside the world<br>When actually is an organization innovative? |
| Reduced Learning performances | Why does agile way of working not give the room for people to learn?<br>We would like to know success stories: innovation achieved in agile way of working<br>What can we do to innovate for our customers and plus generate IPR while working in agile?<br>Alignment of feature rollout with break through innovations |

labor was divided across the development of new software. The outcome of the investigation revealed a quite common self-referentially of the teams, with no cross-formal ties. The only exception was in the case of two teams actually working on the development of the same feature. The main constraints to the creation of informal ties, were identified in:

1. The agile philosophy, of which Scrum is a specific version, creates a quite strict work protocol to which individuals have to comply, both individually, or in sub-teams and as a whole team. Additionally, the adherence to the Scrum standards, the inter-functional composition of the teams, and the fact that each team has to release a self-standing product create a "designed" and very solid interdependency within the teams. Such an internal interdependency and the constant time pressure inhibit the generation of cross-team informal ties, as well as the extra-team knowledge sharing (e.g., Van den Hooff and De Ridder 2004).

2. The push towards efficiency declined in a series of choices that jeopardized and limited the activation of informal ties and the activation of any horizontal knowledge sharing, such as the limitation of physical spaces for relaxing and resting and the absence of social events (only technical meeting took place).
3. Again in terms of short term objectives, the process innovation the company launched some communities of practices as a mechanism of knowledge sharing.

The analysis of the teams' performance confirmed the qualitative intuition of a lack of priority for innovation. The interview data show that teams have clear performances goals (cost, time, quality). All the additional documents analyzed also displayed a major organizational commitment toward the attainment of project goals. Consistently, the organizational design for efficiency shows that there are management roles within the team (ScM) and over the team: line managers, line responsible and POs (Fig. 13.2).

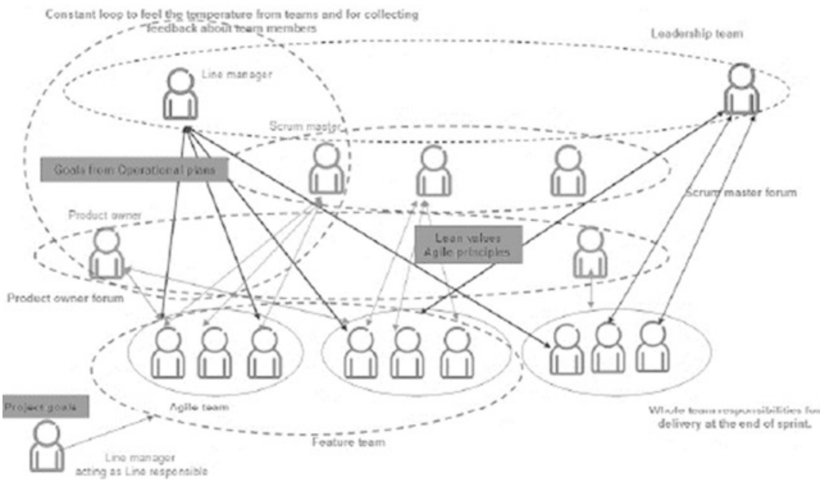


**Fig. 13.2** Organizational design for efficiency: Line managers, line responsible, and POs

All of them are committed to the project goals and targets along different lines of action. Additionally, individual team members did not have specific individual goals linked to innovation.

Here, we see the big discrepancy. On the one hand, innovation and learning are a fundamental element of the Scrum approach. On the other hand, organization design invests in innovation responsibilities only at the level of the organizational units, and above them figures operating at the company level (macro-level). On the other hand, at the micro-level (individuals) innovation was still intended as an individual effort without assigning specific job responsibilities to any role in the agile organization and teams. Hence, innovation came to be demanded at the individual level against the current tendency to have an overall team responsibility for maintaining the short-term goal commitments. That evidence shows a flaw in organization design at the team (meso-) level resulting in a lack of innovation.

The company studied is classified as a hi-tech, research-based firm. That required a further investigation on this subject of innovation. The adoption of Scrum was intended as a way of solving different tensions in the search phase of innovation, via the generation of new ideas. Such tensions referred both to the nature of knowledge (process vs. product/technology) and proximity of knowledge (local vs. distant)

From the data collected, it seems the efforts of the company are directed toward both searching for the sources capable of enriching the existing fund of knowledge and competences on agile ways of working, as well as the knowledge that makes it possible to broaden the existing product/technological capability through the generation of unfamiliar (for teams), distant and remote technological knowledge. Such tensions can be further deconstructed and identified by distinguishing between the process and the product/technological dimensions. On a closer look, the company seemed to be able to implement strategies of the process and product exploitation via the Scrum teams (Fig. 13.3), while the radical product innovation (mostly technology-driven) was managed in other organizational units dedicated to the technology update. The overall organization design is lacking roles and mechanisms capable of enacting product and process exploration.

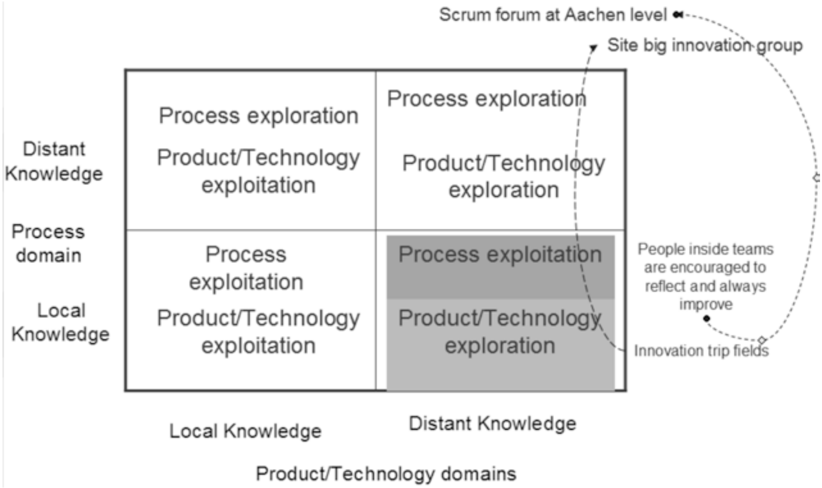


**Fig. 13.3** Scrum as a way of solving different tensions in the search phase of innovation

## 13.4 Discussion and Conclusion

The undermining of innovation at team level can be seen as a result of a wasted organizational opportunity for product innovation which is mirrored in the current structural design and operational plan of the organizational units. The issue rests on the role that the innovation coach role might actually play against the other Scrum-related organizational responsibilities. This is mostly true if the role of innovation coach exercised as a secondary role for a line manager belonging to the unit leadership team. In fact, such a multiplicity of line manager responsibilities allows "leadership team members" to actively manage conflict to resolve tensions rather than allowing them to become an obstacle in the team interactions. Moreover creating multilevel roles and goals helps team members shift from focusing on competition to focusing on individual strategic agenda as well as the unit's overarching strategic agendas.

That situation of the self-referential teams confirms that the greater the closeness of the teams, the greater the chance that solutions are sought internally. Such cohesiveness emerged also in a strong team identity, displayed in sets of behaviors and characteristics by which an individual is recognized as a team member. Accordingly, there is a commitment to the team from each team member leading to the acceptance of team goals and values which have been built precisely around project goals and agile/lean values continuously reinforced by the Scrum.

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# 14

# Lean Start-up in Established Companies: Potentials and Challenges

René Chester Goduscheit

## 14.1 Introduction

Lean start-up (Blank 2013) is an emergent perspective on how entrepreneurs can bring new products and services to the market. This approach challenges the dominant role of lengthy business plans, linear product development processes, and seeking a complete overview of the potential of the new offering before market launch. Instead, it suggests that start-ups could benefit from a "minimum-viable product" approach, where products and services are launched when they contain critical features. The emphasis in the lean start-up approach is on business models rather than the elaborate business plan.

The lean start-up logic has primarily been applied to entrepreneurs. However, some scholars (Berends et al. 2016) have more anecdotally described elements of for instance experimentation in established

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companies, which seek to revise/revitalize their current business model. Thorough and elaborate analyses of the conditions, under which the lean start-up is possible or expedient, the barriers and enablers of the lean start-up approach and potential effects of the use of the lean start-up logic within established companies seem to be lacking in the existing literature. While the novel ways to understand key value creation processes seem to hold a significant potential for companies to get an early indication of the feasibility and attractiveness of new products and services, the lean start-up approach is likely to require a substantial ability for the company to incorporate new practices and procedures. This paper seeks to address the gap in the prior literature on thorough analyses of the lean start-up logic in established companies. Hence, the aim of the paper is to answer the following research question:

*How can established companies employ the principles of the lean start-up?*

The paper will be structured with an introduction to the theoretical framework behind the lean start-up approach. This will be followed by a section on the methodology of the paper. The results section will present the overall findings of the paper, which then will be followed by a discussion and, finally, indications of implications and reflections on potential future research.

## 14.2 Theoretical Framework

The theoretical part of the paper will introduce the key components of the lean start-up approach—including adjacent theoretical approaches—and some perspectives on applying the approach to established companies.

### 14.2.1 The Lean Start-Up Approach

The lean start-up approach is based on a number of key principles that have clear managerial implications. The following sections will outline the various principles, which were formulated by Steve Blank (2013).

*Strategy*

The traditional approach to strategy is based on a high extent of documentation in business plans and substantial emphasis on implementation of the outlined strategy. On the other hand, the lean start-up is founded on a focus on the business modeling: The understanding of the company should be a broader perspective on the building blocks of the company—both in terms of value creation and value capture (Teece 2010). Hence, this understanding encompasses both upstream (for instance resources, activities, and partnerships) and downstream (for instance customer segments, customer relationships, and channels to the market) elements Osterwalder and Pigneur (2010). In addition, the lean start-up approach builds on a hypothesis-driven viewpoint, where the company should seek to test the initial ideas and concepts on the market as early as possible rather than waiting to launch the finished product once it has been through the entire development process. This perception of the lean start-up has a substantial number of similarities with the open innovation paradigm, which was introduced by Henry Chesbrough (2003, 2004), Chesbrough et al.( 2006).

*New Product Development Process*

The traditional approach to product development is perceived as a linear process where the finished product is only launched on the market once the market introduction is planned in a step-by-step manner. Conversely, the lean start-up approach is based on customer development: the customers do not necessarily have an initial understanding of their need for the future offering so they need to be 'developed' and nurtured in order to realize the need. The hypothesis-driven perception should be marked by creating the market for the product rather than waiting for the market to be mature for the product launch. Hence, the lean start-up has similarities with the theory on opportunity creation (Dyer et al. 2008).

*Engineering*

While the traditional approach to engineering is that the product should be specified before building it, the lean start-up is focused on an iterative and incremental product development process where the finalization of the product is pushed as far as possible until market launch. The lean start-up approach is founded on a keen focus on iterations of the product and substantive pivots when the ideas need more significant adjustments.

*Organization*

The organizational aspect of the lean start-up approach builds on a team structure, where the staff is organized in development teams with a focus on customers and product development. In addition, the lean start-up hires for learning and enhancing speed to market. In contrast, the traditional approach to organizational design is built on departmental, divisional and silo structures, and the recruitment process is aimed at the experience and the ability to execute.

*Financial Reporting*

The logic of traditional financial reporting is accounting: Income statements, balance sheets, and cash flow. The lean start-up approach represents a shift from the accounting practice where the focus is on customer value and customer acquisition costs. The lean start-up is seeking to focus on metrics that matter in the particular development process rather than the generic list of measures that are typical for accounting.

*Failure*

The traditional approach to doing business is to avoid failure and that lack of success should be the exception. On the other hand, the lean start-up is based on the idea that failure should be expected and that iterating ideas and pivoting should contribute to limit the failures. In this sense, the lean start-up has similarities to open innovation as it is described by Chesbrough (2012). Hence, the lean start-up is focusing on managing false negatives rather than minimizing false positives.

*Speed*

Finally, the traditional approach to business is founded on development on the basis of complete data and a constant measurement of the progress of for instance the product development process. On the other hand, the lean start-up is seeking to push an understanding where the speed to market is driven by good-enough data rather than perfect data. This perception is linked to the points about hypothesis-driven perspective to business.

### 14.2.2 Lean Start-Up in Established Companies

The inspiration for the lean start-up approach comes primarily from the special traits that characterize entrepreneurs. These entrepreneurs are marked by a culture of hypothesis testing and close interaction with the customer rather than aiming for the perfect product before launch. Hence, the theoretical body behind the lean start-up has a substantial number of similarities with the literature on breakthrough innovations, which has been presented by O'Connor and Rice (2013). This research focuses on the value of experiments with both products and business models, iterations of the various phases of the development process and early market/customer involvement as a prerequisite for the successful market launch of breakthrough innovations. In addition, these studies of breakthrough innovations emphasize the impact of internal collaboration between the various functions within the organization. The team, which is driving the process, should be characterized by cross-disciplinarity combining technical and market-orientation skills.

The transfer of the logic of the start-up culture to established companies is by no means trivial. An experimental, hypothesis-driven approach to innovation will put a substantial requirement on strategy, organizational set-up, management, staff, etc. within these established companies. The rich literature on both market and technology-driven disruptions (Habtay 2012) describe how established companies find it difficult to be as light on their feet (van de Vrande et al. 2009) as market entrants with lower levels of standard operating procedures, other perspectives on their offerings and few limiting customer expectations about products and services. Christensen et al. (2013). Hence, the successful transfer of the principles into an empirical setting with incumbent companies is highly likely to include some challenges. These potential challenges will be scrutinized in the following parts of the paper.

## 14.3 Methodology

The paper follows the methodology guidelines for case research in industrial marketing developed by Piekkari et al. (2010). Hence, it employs the principles of purposeful sampling, triangulation, respondent validation, and systematic procedures for data analysis through coding. The following section describes the sampling of the case companies, the data collection and the data analysis in order to enhance the transparency and credibility of the study (Barczak 2015).

The selection of the seven cases is based on the *theoretical sampling* (Eisenhardt and Graebner 2007). Hence, the cases are expected to be particularly suitable for illuminating and extending the theoretical framework on the lean start-up approach in established companies (Whetten 1989). This sampling of cases is made in order to let empirical observations fertilize the development of the existing theory and with the view to go beyond theory development as a purely self-referential exercise (Siggelkow 2007).

The basis for case selection can be summarized through four elements:

1. *Manufacturing companies with physical products*: All case companies provide physical products to the market. These products represent a range of technological complexity.
2. *Small and Medium-Sized Enterprises*: In spite of the fact that the seven companies represent a wide range of industries, they are all categorized as SMEs. Hence, they are likely to be confronted with similar

challenges in terms of the liabilities of "smallness" (for instance scarcity of various resources (Pullen et al. 2012)).

3. *Vision to employ elements of the lean start-up approach*: All the case companies are marked by key actors (primarily senior managers) that wish to employ aspects of the lean start-up approach.

The seven case companies are presented in Table 14.1.

We conducted twenty-two personal semi-structured interviews. An interview guide was prepared prior to the interview but the interviewer ensured that the interviewee was given the necessary degrees of freedom to shed light on unforeseen aspects of the project. Topics related to strategy, new product development, the perception of failure, etc. were among a number of themes within the interview guide. Some of the other themes of the interview guide touched upon the understanding of the internal and external environment and the relevance of the ventures of the company.

The interviews were audio-recorded and transcribed verbatim. In addition, extensive observations, which were made during the interview (for instance, the body language of the interviewee), were noted and included in the documentation of the interviews.

**Table 14.1** Case studies

| Case | Product | Focus of the service innovation |
|---|---|---|
| Alpha | Energy surveillance products | Constant feedback on energy performance |
| Beta | Oil filters for maritime companies | Surveillance of the status of the oil |
| Gamma | Telephony communication devices | Business communication analysis and management |
| Rho | Producer of measuring equipment | Common on-site customer platform for self-service |
| Sigma | Equipment for ventilation sand climate control in poultry production | Climate surveillance and resource optimization for climate control |
| Tau | Automation equipment for industry | Real-time surveillance of automation solutions |
| Chi | Machinery for industry | Provider of leasing solutions of the machines |

Generally, the interviewees were the people that had been actively involved in the strategic work of the companies. However, in some cases senior managers and developers, who had not been directly involved in the strategy work, were interviewed. These interviews with senior managers and developers were carried out when the initial interviewee suggested that the other person was interviewed as well because he or she might have a better impression of the relevant process in question.

Ideally, three or more people should be interviewed from each of the companies in order to reduce the risk of bias (Eisenhardt 1989; O'Connor and Rice 2013; Yin 1994). However, in many of the cases, the strategy work was marked by a 'champion approach' (Goduscheit 2014) where one individual was more or less driving the reorientation him/herself with only limited involvement of other people within the organization. This champion approach tends to make additional interviews within the companies obsolete.

Together with archival data from the companies (company websites, strategy plans, formalized agreements with customers/suppliers on data access, etc.), the interviews form the empirical basis of the paper. In addition, the author conducted direct observations in one of the companies. These observations include, for example, internal project meetings, network meetings, and meetings with customers. Furthermore, some of the case companies took part in a publicly funded network program for SMEs with an ambition to develop their service strategy. The author participated in five network meetings and observed the companies that were involved in the meetings. This gave the author the possibility to document the cases through thick descriptions (Geertz 1973). The observations were documented in extensive descriptive field notes, individual reflexive notes made by the involved researchers and then triangulated through comparison of reflexive notes (Creswell 2006).

The substantial data material was analyzed through an inductive, interpretive methodology (Corley and Gioia 2004). The goals of the methodology were to transform the data into a manageable number of variables or themes and to identify potential causal connections between these variables (Noble and Kumar 2010). This methodology encompasses two elements:

1. The inductive approach is materialized through an open coding of the collected data which is addressing the topic of the paper. Hence, the initial data analysis was not aimed at testing the established theoretical framework on the lean start-up approach but rather at obtaining a more comprehensive understanding of (unforeseen) aspects of the topic.
2. The interpretive research element seeks to build an emergent theory from a perspective that addresses the interpretations of the participants (Corley and Gioia 2004).

Thus, the paper adheres to the observation made by Aaboen (2012) that multiple case designs require some sort of prestructured frameworks to enable case comparison. While the data analysis, on the one hand, should give leeway for the rich details of the qualitative interviews, it should, on the other, be guided by the thematic limitation of the paper.

The paper employs a systematic procedure for data analysis (Kumar and Noble 2016). The data analysis is based first on inductive elements, where the parts of the data material, which are aimed at the strategic orientation of the company, are coded. Following the guidelines for inductive research, this part of the process is kept as descriptive as possible (Hargadon and Sutton 1997).

Second, the various coded pieces of material are clustered together on the basis of axial coding into higher order themes so that each represents perspectives on the strategizing of the company.

Finally, these themes are gathered into several overarching dimensions that can be linked to the constructs of the theoretical framework: the lean start-up approach.

The data analysis was not done in a linear process but was carried out recursively with a number of iterations of the three stages (Locke 1996).

The coding was carried out in the text analysis software program NVivo, which is a common tool for qualitative text analysis (Vlaar et al. 2007). NVivo is used as a tool for the initial, first-order coding, the axial coding, and the collection of themes into overall dimensions (Bazeley 2007). As stated by Gummesson (2003) software can assist but must not take over the interpretation of qualitative data sources. This interpretation requires an ability to continuously learn about a given process and develop the understanding of what is happening in the project. On the basis of these considerations, the paper has employed various types of data analysis validation. The researchers involved in the research program carried out an 'external' analysis of the generated data as follows: through triangulation (Denzin 1978) of field notes and other sources of data, they have sought to establish a common understanding of the development. In addition to the external data analysis, the researchers conducted respondent validation of the findings from the various case studies. Finally, the researchers followed a member-check procedure (Lee and Baskerville 2003), presenting their perception of the cases to the initial interviewees and other participants within the companies. This external–internal exchange of perceptions has generated new knowledge about the projects and valuable input to the analysis of the case companies.

## 14.4 Results

While the SMEs that form the empirical point of departure of the analysis are very different, and their approach to the implementation of the principles of the lean start-up approach into their organizations are just as unique, the seven cases hold a number of common themes that should be discussed in more detail. These themes are identified on the basis of the open coding of the parts of the interview data that are related to what the interviewees describe as essential within the transition from a traditional approach to strategy and product development toward the lean start-up approach.

The following sections present the overall findings.

### 14.4.1 Central Elements in the Lean Organization

The analysis of the data from the case studies identifies two overall pivotal elements in the employment of the lean start-up approach: The essence of external collaboration and the value of intra-organizational integration.

*External Collaboration*

The case studies illustrate the essentiality of an active involvement of a wide range of external actors in order to succeed when employing the lean start-up approach. Several of the case companies explain how they had to open up the innovation process and the management approach as such in order to be able to embrace the principles of pivoting the initial ideas and concepts.

The most central group of stakeholders among the external collaborators consists of the customers. The theoretical framework on lean start-ups describes the market and the customers as a homogenous group of actors that are subject to the experiments and iterations from the company that is using the principles of the lean start-up. However, the case studies illustrate how the customers are by no means a monolithic part of the equation. In order to be able to employ the lean start-up approach, the focal company needs to differentiate substantially between the broad group of customers on the one hand and the selected customers that would be relevant for the numerous iterations for the development of new or revised offerings. An illustrative example derives from the *Gamma* case. During a meeting with one of the potential customers (one of the world's largest wind turbine producers) of the business communication analysis, which *Gamma* was seeking to introduce to the market, the CEO of *Gamma* explicitly labeled the project as a "trial-and-error" initiative. The CEO explains to the customer that the first versions of the offering would most likely be marked by serious flaws at the beginning but that he hoped he would benefit from the patience of the customer and that he would receive solid inputs that could, in turn, improve the solution. At the same time, the CEO described this approach to the development of a new service as something that the company was not used to and that he did not feel particularly comfortable with. Therefore, the company perceives the customer as a co-creator throughout the development process rather than as a mere receiver of a final product.

Another example of the essence of proximity to selected customers comes from the *Tau* case. The development director, who is interviewed, describes how his interaction with the customer is based on the constant development of the value proposition of the customer. Hence, he was very keen on understanding the job-to-be-done by the real-time surveillance system (Anderson et al. 2006). On a regular basis, he makes calculations about how his surveillance system can ensure that the uptime of the systems is optimized and, via this, make the production facility more profitable.

The lean start-up approach tends to involve an extensive vulnerability of the focal company. The customer should be willing to get involved in the trial-and-error process, spend time to do the iterations and accept that the provider of the offering has to find its way through the more or less flawed prototypes before the final and satisfying product is generated. An inherent part of this process is the consideration that the customer would get tired of the focal company and potentially choose another provider.

Other external actors besides the customers are described as central in the lean start-up approach. The case companies explain how the more open innovation process necessitates the involvement of collaboration partners that they did not work together with to the same extent before. Pivoting the prototypes of the products might lead to a need to revise the offering in a direction, where the focal company does not have the necessary competencies and, hence, would need to partner with other individuals or organizations that possess these competencies. An example is *Sigma*, which is developing new, data-based concepts for measuring the temperature, humidity, air quality etc. in the poultry production. After the first few iterations of the solution prototype, it was clear that *Sigma* did not have the competencies needed for meeting the customer requirements in-house. This led to a need to engage a university that could do the necessary data analysis for providing the depth of the data analysis. This collaboration was not something that *Sigma* was used to be involved in from previous lines of business. The handling of these boundary-crossing collaborations was perceived as a significant challenge to the management of *Sigma*.

*Internal Integration*

As described in the theoretical part of the paper, the internal organizational aspect is essential in order to be sufficiently agile and accommodative to the shifting requirements by the customer during the hypothesis testing process. The small adjustments (the iterations) and more substantial changes (the pivots) require that the response time from customer feedback to alterations in the practices is short, and this has an impact on the collaboration within the organization.

One of the case companies, the *Chi* case, describes how the sales people and the technicians from the service department initially found it very difficult to work together. The interviewee is very aware of the challenges that this lack of collaboration put on the overall effort to be agile to the customer expectations. The interaction between the insights of the two groups of people is described as a necessity in order to thrive.

Similarly, in the *Tau* case, the collaboration between the technicians and the product development department represents an essential link between the focal company and the customer. Hence, the technicians are functioning like the canary in the coal mine: When the customer has a particular need or complains about the prior versions of the offering, the technicians are the first to experience this and to feed the insights back to the developers. This feedback loop provides key insights for the iterations and sometimes even pivots that are necessary for the development process.

Another aspect of the intra-organizational perspectives on the lean start-up is the self-perception within the organizations. In the *Alpha* case, the product developers found it difficult to accept that they were not providing the perfect offering for the market in the first place. It is described how this was seen as something that was jeopardizing their professional pride. The transition to a lean start-up oriented approach tends to be particularly difficult to handle internally within companies with a long history of providing high-quality goods. The fact that the offering was subject to a number of experiments and iterations was perceived as something that ran counter to the self-image of the employees.

### 14.4.2 A Categorization of the Companies

The Table below illustrates a categorization of the cases on the basis of the three key parameters outlined in the previous sections. Table 14.2

**Table 14.2** Internal and external structural characteristics

| Internal integration | | External collaboration | |
|---|---|---|---|
| | | Low | High |
| | Low | Traditional approach | Externally aware |
| | High | Agile organizational adaptiveness | The lean start-up organization |

The seven case companies employ varying approaches in their implementation of the lean start-up logic. Generally, the companies are relatively externally aware: They seek to engage a selected few customers in order to get the early feedback on the raw prototypes and they aim to engage various external and upstream collaboration partners with the view to be agile enough to meet the requirements of the market. On the other hand, the intra-organizational focus tends to be less pronounced within the case companies. Several of the companies describe how they suffer from lack of collaboration within the divisions of the company. Only the *Alpha* case tends to meet the criteria of being high on both internal integration and external collaboration.

## 14.5 Discussion and Implications

The essential idea behind the lean start-up logic is appealing: The agility and accuracy of doing business should improve when the proximity to customers is increasing, when iterations and pivots are made possible and when the launch of a product is not dependent on a lengthy 360 degree analysis of the market, on which the offerings should be introduced. However, this paper illustrates that often the distance between the good ideals and the actual implementation of the lean start-up approach is substantial. Established companies are marked by path dependencies, cultural inertia, and self-images that make the execution of a radically different approach to business difficult, if not impossible. The lean start-up approach could be subject to the same objection as prior attempts like open innovation, open business modeling, and user innovation to challenge the existing strategic paradigm: What makes sense on paper in textbooks is not necessarily meaningful in a real-life setting within established companies.

On the other hand, the case studies also illustrate that some companies seem to have thrived in finding inspiration from the lean start-up approach. These companies are described as relatively traditional in terms of both internal organization and external collaboration partners. The change is not a two-step process of conception and execution—the change happens incrementally over time and the experiences with the changes in the central business processes are forming the transition between the traditional and the leaner start-up process. Hence, the implementation of the lean start-up is similar to other radical transitions like business model innovation (Berends et al. 2016).

The paper illustrates that in order to enhance the chances of success, the lean start-up approach has to be built on a solid relationship to one or few customers that are willing to 'play the lean start-up game' and accept flaws and mishaps in the first parts of the process. From a managerial perspective, this represents a substantial task. Especially, companies with an established reputation of providing high-quality offerings, the acceptance of mistakes, and loosing face in the relationship to the customers (and in the competition with alternative providers) is a daunting task.

As indicated in the prior sections of the paper, another considerable task within the transition is to make the intra-organizational set-up meet the requirements of operating on the basis of the lean start-up. In order to be flexible, agile and have a finger on the pulse in terms of ensuring continuous feedback from the customers, intra-organizational silos need to be challenged and minimized. Cross-functional teams and ensuring bilateral collaboration between for instance sales, service, and product development within the organization seem to be a prerequisite. This is in line with the implications of seeking to generate breakthrough innovations (O'Connor and Rice 2013). But even with these organizational design initiatives, the management task in relation to the transition is of a much more profound nature. The individual employees need to buy in on the lean start-up approach and act in accordance with the principles.

The case studies tend to indicate that the transition toward the lean start-up approach is carried out in the context of other, parallel strategic changes within the company. Hence, the transitions are happening together with the introduction of a servitization strategy, a data-based innovation agenda or an open innovation perspective to the company. These parallel strategic transitions have a tendency to give momentum to the lean start-up approach and enhance the chances of implementation of the overall strategy. This paper, however, precludes the analysis of the successfulness of the strategy (for instance, in terms of market share, turnover, profitability, etc.) and the successful implementation of the strategy is not necessarily the same as the successfulness of the strategy as such.

Finally, the case studies presented in this paper illustrate the essence of having a committed and strong person to drive the transition. Hence, the cases seem to document that the transition is depending on a person that has similarities to what is called a product champion or an innovation promoter within innovation management (Gemünden et al. 2007; Goduscheit 2014). This promoter should be marked by both abilities to operate internally within the organization and externally with the variety of stakeholders beyond the boundaries of the firm. Hence, the person in charge of the transition should be marked by characteristics from the power, the relationship, and the process promoter (Hauschildt and Kirchmann 2001).

## 14.6 Limitations and Future Research

This paper presents some initial findings from seven case studies of companies that explore the employment of the lean start-up approach. The mere number of cases represents a limitation in terms of the generalizability of the findings. The insights from the qualitative setting could feasibly be tested in a more quantitative setting, in which a larger sample of companies has implemented the lean start-up approach. It would be interesting to shed light on whether some industries are more likely to use lean start-up, whether company size, company age, or the educational level of employees has an impact on the likelihood of embracing lean start-up etc.

An interesting aspect of the transition to a lean start-up approach is the mind-set of the leadership within the companies that seek to implement lean start-up as a guiding principle. Future research could explore which leaders are most prone to explore lean start-up. Potentially factors that could affect the likelihood of embracing the lean start-up approach could be age and educational level of the manager.

Finally, future research could explore whether the two dimensions in Table 14.2 has an effect of the success that companies can experience when embracing the lean start-up approach. Key questions could be aimed at whether companies that are very oriented toward external collaboration are more successful than companies that focus on intra-organizational integration. In addition, this examination could also point to potential preconditions for moving into the (rare) combination of externally aware and intra-organizational integration.

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# 15

# Lesson Learned, Implications, and Summary of the Main Findings

**Federica Brunetta, Maria Carmela Annosi, Mats Magnusson and Paolo Boccardelli**

The purpose of this book was to tackle issues related to learning and innovation, by looking at hybrids and new organizational forms through the theoretical lenses of strategy and organization. The editors invited scholars working in heterogeneous disciplinary backgrounds and with different theoretical perspectives, to analyze and interpret different

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phenomena, processes, and practices of learning and innovating within the vast realm of hybrids and new organizational forms.

The motivation of the book was to analyze the challenges arising from the ever-changing competitive environment and understand how firms react to the destabilization of roles, tasks, and identities by adopting new organizational designs, practices, competencies, collaborative arrangements. Provided that learning and innovation stand at the core of the hybrid organization design, the authors have offered fertile ground to understand the relationship between organization and innovation both in terms of theoretical and empirical contributions. The book has introduced and tried to address critical questions related to the (i) management of innovation, learning, and value creation; (ii) structural and strategic issues arising while innovating in hybrids and "new" organizations; and, finally (iii) how hybrids and new organizations can respond and adapt to strategic and organizational change.

Within this final chapter, editors synthesize elements that have been theorized across the volume, briefly recapping the main findings of the different studies. The aim is to summarize and suggest further avenues for research both for theory and empirics based on the proposal arising from the contributors and from the editors' own reading of each chapter. However, it is the belief of the editors that it is the reader who will be able to see the connections between each chapter, and best understand the potential avenues for research. Of course, the aim of the editors was *in primis* that of offering an overview of the main issues and critical points, identifying convergences among different approaches, literature, settings, and theories.

## 15.1 Innovating, Learning, and Value Creation

The first section of the book is devoted to studies related to the management of innovation, learning, and value creation. Within this group of chapters, the authors offer insights on the understanding of novel forms of organization that may foster innovation (Sherwani and Tee, Vicentini and Nasta, Marchegiani, and Arcese) and the role of specific methods and principles to increase innovative outputs (Annosi, Hemphälä, and Brunetta)

Sharwani and Tee, in the chapter "*Innovation and Value Creation in Business Ecosystems*" describe business ecosystems an emergent type of organizational form that can be defined as "the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize" (Adner 2016). Business ecosystem combines open membership boundaries with a highly stratified and more hierarchical decision making (Gulati et al. 2012). Composed by both providers and customers, ecosystems offer benefits for all parties. In the context of innovation management, middle-level players act as bridges or facilitators, fostering interaction, and building dependencies. Their contribution addresses the relevance of ecosystems and interaction and how they may contain challenges and benefits of knowledge integration and resulting innovation outcomes. The authors propose a framework, where ecosystems are composed of business networks, knowledge integration, and innovation management. They suggest that ecosystems should be analyzed at multiple levels, especially in the form of hierarchy in order to understand the connection and information flow.

Within their chapter "*Team and Time within project-based organizations: Insights from creative industries*," Vicentini and Nasta focusing on Project-based Organizations (PBOs), apply the integrative framework proposed by Bakker (2010) that investigates the temporal organization forms along four main themes (task, team, time, and context), authors compare project-based organizations placed in creative contexts. More specifically, the authors analyze to what extent these four themes affect the performance of PBOs that play in TV drama series industry and music industry. To address this issue, the authors review the literature on temporary forms by distinguishing among different types, and apply the integrative framework to PBOs in the creative context of music and TV drama series.

In the chapter "*Collaborative spaces and coworking as hybrid workspaces: Friends or foes of learning and innovation?*," Marchegiani and Arcese presented an interesting work on coworking as a potential collaborative layout boosting creativity and innovation. The authors focused on the opportunities and threats offered by coworking, especially within the context of the collaborative and sharing economy (Gandini 2015), provided that coworking enhances the possibility for firms to collaborate, increasing the chance for externalities positive spillovers, but at the same time presents organizational challenges. They present three interesting case studies, Talent Garden, Gottifredo—Media Art and The Hive and I love mum, each presenting different facets of coworking experiences and impact on the creativity and innovation. As a matter of fact, they show how coworking spaces represent *relational milieus* (Gandini 2015) providing an intermediate territory to "enact distributed organizational practices made of continuously negotiated relationships in a context where professional social interaction is simultaneously physical and digital (Gandini 2015, p. 200)." Provided the novelty of the issue, and the lack of empirical and theoretical studies focused on coworking, the study sheds light on coworking as an organizational layout boosting innovation by using three case studies. Further avenues of research are vast and extend in different directions (as recalled by the authors, within the organizational design, open innovation practices, the outcome of collaborations).

Annosi, Hemphälä, and Brunetta provide a contribution on "*Investigating the impact of agile methods on learning and innovation*." The authors highlight different issue within the agile methods setting: First, respective information exchange of product and process ideas and learning about product and process tend correspondingly to support product ideas or process ideas; second, depending on whether the teams exchange information about processor product matters this creates trade-offs for product innovation; third, product information exchange facilitates product innovation and agile information exchange hampers it, then, increasing experience with agile methods tends to squeeze out product innovation, and, finally, use of agile methods facilitates process learning and information exchange in agile teams.

The aim of Annosi et al., is to identify which variables were relevant to explain differences between product and process innovative efforts within the total domain of variables reported in the literature and highlighted during the interviews as being important for innovation. Finally, five variables remained as independent predictors of innovation activities, process, and product information flow, process, and product learning and agile experience. They have observed ambidexterity in agile contexts using an exploratory approach, and more fine-grained units of analysis such as the agile team. Further avenues of research lie in a deeper and more thorough analysis of the implications of the research in the contributions to the ambidexterity literature, as the setting and the unit of analysis provide an interesting point of view on the need to exploit and explore knowledge bases.

## 15.2 Innovating: Structural and Strategic Issues

The second set of studies is oriented towards the understanding of structural and strategic issues that may arise in the quest for innovation. Three contributions are proposed in this section and are related to network studies, in the light of the fact that network in increasingly identified as the "locus of innovation" (Powell et al. 1996). Two chapters specifically focus on network structure for innovativeness for PBOs, either theoretically (Brunetta, Boccardelli, and Lipparini) or empirically (Magnusson, Mascia, Di Vicenzo). The third analyzes the diffusion of technologies in professional networks (Iacopino, Mascia, Monti, and Cicchetti).

The first two chapters of the section analyze the role of networks on productivity and innovation for project-based organizations (PBOs). The theoretical contribution from Brunetta, Boccardelli, and Lipparini "*The role of networks for innovation in project-based organizations*" provides a review of the literature related to R&D networks as loci for innovation and a synthesis of the academic debate on optimal network structures to foster innovation and productivity, focusing on the characteristics of temporary and project-based organizations. These type of organizations, by bringing repeatedly together resources and knowledge, are exposed to different stimuli, ideas, information, and opportunities, which can be enhanced or hindered by different network configurations.

The chapter prepared the ground for the work by Magnusson, Mascia and di Vincenzo "*Project social capital in biotech R&D: its configuration* *and impact on knowledge development.*" Their empirical study focuses on Project-Based Organizations in the biotech industry. They look at projects and their connection and integration potential residing in contacts and communication (Manning and Sydow 2011) using the idea of project social capital proposed by Di Vincenzo and Mascia (2012) to capture the potential for integration and learning residing in a project's external linkages. The authors confirm that certain structural configurations maximize the level of effectiveness in knowledge development. More specifically, they show how moderate diversity within project social capital, is correlated with higher knowledge development performance, depicting an inverted U-shaped relationship between projects' network range and their level of knowledge development. Their contribution is relevant given a lack of studies empirically the interdependences between projects and the network of personal relationships built around projects (Grabher 2002). Moreover, aligned with the contribution from Brunetta, Boccardelli, and Lipparini, they analyze the relationship between network structure and innovation for PBOs within the biotech setting. Their study proposes several avenues for further research, both at the empirical design level and from a theoretical standpoint. Indeed, they claim the need for a future longitudinal research to determine the direction of causality of the relationship found, and invite a scholar to investigate knowledge development at the project level, by using diverse project aspects that can account for knowledge outcomes.

A second empirical study, also based in the healthcare industry, is the one by Iacopino, Monti, Mascia, and Cicchetti "*Professional Networks and the Adoption of Medical Technologies: An Empirical Study on Robotic Surgery*," The motivation of their studies lies in the importance of the advancement of knowledge and the availability of new technologies in health care, which has deeply influenced patients' length and quality of life. Within healthcare, the success of a specific technology can be measured by its use in clinical practice, which is originated by a highly regulated process involving several stakeholders and levels of health care system, and as such, does not follow a linear trend. This chapter presents the case of the adoption of the Da Vinci Surgical System in the I-NHS. The authors' aim is understanding the role of informational determinants, namely the mind lines and the guidelines, in the choice of adoption of a specific technology. The implications and potential avenues for research are twofold: first, the study contributes to the literature on innovation adoption, and the relation to informational determinants, and suggest to assess the potential effect of both individual attitudes and social network explanations in order to have a fuller explanation of individual's behaviors (e.g., Monti and Bergami 2014; Monti and Soda 2014); second, the study has strong managerial implications for decision making, highlighting the importance of Evidence-based medicine.

## 15.3 Adapting Innovation and Learning to Strategic and Organizational Change

The final part of the book comprised of contributions related to the development of specific organizational solutions or firm capabilities to adapt the innovation and learning process in the light of strategic or organizational change. Indeed, innovation is inherently associated with change. This section includes six contributions. The first one is related to the design of macro-and micro-level features to foster resilience within an organization (Giustiniano and Cantoni). Then, two studies on the role of controls, in "new" organizations and in the context of agile are presented (Annosi, Brunetta, Magnusson, and Boccardelli; Annosi, Martini, and Magnusson). Agile and agility are also at the core of the following two chapters (Giustiniano, Cunha, Neves e Rego; Annosi, Giustiniano, Brunetta, and Magnusson). Finally, the last chapter proposes lean start-uping as a method for established companies to adapt to change.

In their chapter "*Between Sponge and Titanium: Designing micro and macro features for the resilient organization*" Giustiniano and Cantoni, highlight how resilience can stand of the basis of strategic sustainability and help firm face unexpected events They argue how resilience is to be nurtured as an organizational capability through an appropriate managerial style, highlighting resilience as a phenomenon characterized by robustness, redundancy, and resourcefulness, with two possible performances: response and recovery. Moreover, the two authors have analyzed in depth the resilient organization and specifically its design features, both at the macro level, looking at the organizational structure and assets and at the micro, with the promotion of resilience via HR strategic management. In the latter, they have analyzed how to nurture resilient behaviors within the recruitment and selection processes, internal mobility, performance evaluation and compensation, and learning. They have suggested a design framework filling gaps at the structural, behavioral, and cognitive level arising from existing theories.

Their work contributes to the ongoing academic debate on how organizations can face unexpected events. And suggests a more comprehensive framework for managers and policy makers to operate their choices. Nonetheless, we agree with the authors that novel managerial and non-managerial theories, models, and components are needed to fuel the academic debate and help managers deal with resilience. For example, as Giustiniano and Cantoni propose, a structural framework for creating resilient organizations within the contingency perspective (e.g., Donaldson and Joffe 2014; Välikangas and Romme 2013).

Within the chapter "*Issues of control in hybrids and "new" organizations*" Annosi, Brunetta, Magnusson and Boccardelli shift their attention to the theme of organizational controls—broadly defined as any process by which organizational members direct attention, motivate, and encourage others to act in ways desirable for achieving organizational objectives. Control is commonly recognized as fundamental to the functioning and performance of organizations. The authors, given the dearth of a theoretical explanation for how controls, in the new organizational context, operate in combination, review the current understanding on the organizational control underlying the self-regulative learning processes. Annosi et al. investigate the micro, meso and macro level of controls acting on the self-managing teams and clarify the reason of team's behaviors and their influence on both teams' innovativeness and learning performance. They identify and explain the relevance of the following types of controls: managerial diagnostic, interactive, belief, boundary control systems, placed at macro and meso level, together with the value-based concertive control placed at micro level. Finally, they analyzed identity as a potential source of control (Annosi et al. 2017; Annosi and Brunetta 2017).

Annosi, Martini, and Magnusson in their chapter "*Investigating the impact of agile control mechanisms on learning in scrum teams*" analyzed Management Control Systems (MCS) resulting from the implementation of agile development methods, relying on an established MCS taxonomy. The authors provide evidence about the existence of a new typology for MCS structured around four groups: diagnostic, interactive, boundary, belief control systems. An abductive approach was adopted, considering the shortage of research evaluating the post-adoption effects of agile methods. Four organizations from an international telecommunication firm that implemented agile methods were involved, and 44 individual semi-structured interviews were performed. In addition, 121 free comments from a global survey to the same organizations were used as secondary data. The paper indicates how Scrum, a widespread agile method, implicitly brings multiple enforcing levers of control to a team's self-regulatory learning processes.

Giustiniano, Pina e Cunha, Neves, and Rego discuss agility as an improvised accomplishment conducted by improvisational leaders within their chapter: "*Improvising agility: organizations as structured-extemporaneous hybrids*." In doing so, they articulate literatures on improvisation and agile management to indicate possible areas for cross-fertilizing an organizational hybrid. More specifically, they focus on the so-called "triad" of the leadership process (leaders, followers, and context) form which the four principles of agility stem, as identified by Rigby et al. (2016): (i) people over processes and tools, (ii) responding to change rather than follow a plan, (iii) working prototypes over excessive documentation, and (iv) customer collaboration over rigid contracts. The improvisational understanding of leadership is, indeed, aligned to these principles, thus discussed in the chapter referencing each core principle to leadership as the process of social influence involving leaders, followers, and the context (Kozlowski et al. 2016).

The study "*The emergence of new organization designs. Evidences from self-managed team-based organizations*," performed by Annosi, Giustiniano, Brunetta, and Magnusson is related to deepening the understanding of how new organization designs emerge in highly dynamic innovation context to improve an organization readiness to change. They specifically focus on self-managed teams, and explore the extent to which new micro-and meso-level organizational forms contribute to the achievement of organizational efficiency, and produce secondary effects on long term innovation goals by drawing on multiple case studies of R&D companies in the telecommunication industry and on multiple sources of data. Their result shows that the undermining of innovation at team level can be seen as a result of a wasted organizational opportunity for product innovation. They also underline the relevance of roles such as "leadership team members" to actively manage conflict to resolve tensions and how creating multilevel roles and goals helps team members shift from focusing on competition to focusing on individual strategic agenda as well as the unit's overarching strategic agendas.

Finally, Goduscheit proposes a study on "*Lean start-up in established companies—potentials and challenges.*" The chapter presents lean start-up as a 'minimum-viable product' approach, where products and services are launched when they contain critical features. The author builds the contribution using three in-depth case studies from three established companies in order to shed light on the implications (in terms of innovation management, organizational structure, etc.) for companies that seek to employ lean start-up. The author draws interesting insights in terms of strategic changes within the company favoring such approach. Of course, the author recognizes that the insights from the qualitative setting could feasibly be tested in a more quantitative setting, including a larger sample of companies.

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