

# **DESIGNING FOR SOFTWARE DEVELOPMENT TEAM' AGILITY: A LONGITUDINAL STUDY<sup>1</sup>**

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### **ABSTRACT**

This manuscript explores the meaning of agility in the context of software development teams and reports on the study of a software development team in a division of large software firm over a seven-year period. Following a review of the literature on agility we propose a framework for the investigation, analysis, and examination of a software development team in a software development firm. Finally, some propositions for further research are advanced and briefly discussed.

### **1. INTRODUCTION**

At the core of the software development team is the ability to create, transfer and exploit knowledge. Knowledge work consists of tasks that involve human information processing, in which the main activities are expected to generate useful outcomes, even when the product or service cannot be completely specified in advance. Processing originates at the data level, proceeds to the information level, and culminates at the knowledge level which acts on, integrates, and interprets information. The sources of knowledge can be either internal or external to the individual performing the work. A mental model of the task, situation, process and procedures to be performed is mandatory. Finally, knowledge work entails significant additional information. It is the uncertainty and ambiguity of this kind of work that requires agility. Thus, designing for agility implies the need for an alternative work design.

Although the concept of agility has been a part of management for some time, the notion of agility as a new approach to thinking about and implementing the design of software development teams is fairly new. Initially, agility was seen, like flexibility, as one simple property of an organization facilitating change and adaptation. Later, the concept of agility was expanded to refer to a manufacturing paradigm that was seen to be a successor to traditional costing systems for operations and production management, particularly mass/lean production (Sharifi & Zang, 2001). Recent studies focusing on organizational learning, organizational learning mechanisms, and knowledge management have broadened the concept of agility. Agility, in this context, is viewed as a core concept for organization and design (Dove, 1999; Ebrahimpur, 2002; Shani & Docherty, 2003).

### **2. THE FOUNDATION OF AGILITY AND TEAMS**

As of late, agility has been promoted as a new paradigm and a solution for maintaining competitive advantage (Ebrahimpur, 2002; Sharifi and Zhang, 2001). In a continuously changing business environment the firm's agility is critical to its success and survival (Prater, Biehl and Smith, 2001). Agility is defined as the ability of an organization to develop and exploit its inter and intra organizational capabilities to successfully compete in an uncertain and unpredictable business environment (Hooper, Steeple and Winters, 2001). It is the ability to thrive in a

continuously changing, unpredictable business environment. Simply put, an agile firm has designed its organization, structures, processes and products such that it can respond to changes in the time frame that is dictated by the business environment.

## **2.1 Agility and Strategy**

Historically the field of business strategy has focused on the analysis of the industry environment and the firm's competitive positioning in relation to its rivals. Recently, the emphasis seems to have shifted to the interface between strategy and the internal environment of the firm (Grant, 1999). Capabilities are viewed as key elements of the firm's internal environment. At the business level the firm's capabilities are the source of competitive advantage. Thus, the key emerging issue centers on matching the firm's capabilities with the opportunities that arise in the external environment. A company can view an existing business context and examine its current strategy to determine what would lead to success. Alternatively, the company can view existing ways of utilizing its capabilities and specify potentially better alternatives to take advantage of them, or instead to develop internal mechanisms to continuously ensure a successful practice.

The firm's resources define the organization's capabilities. Organizational capability refers to the firm's capacity, when all the relevant resources are combined, for undertaking a specific productive activity. Yet creating capabilities is not simply a matter of assembling resources. Capabilities involve complex design choices about what resources to use, how to group the different resources, what other tangible and intangible resources will be needed from within and outside the firm's boundaries at different stage of the activity and, how to assess, control and reward the resource utilization. As such the firm's resources and capabilities set the stage and choices about the firm's design configurations. From a sustainable competitiveness perspective, we view resources and capabilities to be the foundation upon which the firm's sustainability and profitability can be achieved through the facilitation of flexible learning mechanisms (Docherty, Forslyn and Shani, 2002).

## **2.2 Agility and Design**

Agility has been described in different ways in the literature. At the organizational level, agility can be viewed as the formal configuration -- structures, processes, procedures, rules, tools, methods and physical configurations -- created within the firm for the purpose of developing, enhancing and sustaining development and performance. Just as there are many types of organizational designs, there are also various ways to design and manage agility. The design of a specific configuration is viewed as a rational choice among alternatives based on design requirements, design criteria and design dimensions (Lillrank & Shani, 2001).

Our research to date demonstrated that, in practice, organizational agility could be designed and managed in various ways. These "various ways" have been described as a set of design dimensions, each of which fulfills a necessary requirement for achieving agility. As such, the design dimensions are a basic set of alternative solutions managers can choose from in order to meet the design requirements. The range of alternatives need to be investigated by every

organization and could integrate some alternative solutions from the literature as well as by benchmarking existing solutions.

The necessary but not sufficient set of requirements for achieving agility is referred to as design requirements. Some examples of design requirements might include the following: A legitimate forum for exchange of ideas must be created; a specific set of processes that facilitate ongoing dialogue must be developed; a specific set of tools needs to be developed and/or adopted that facilitate learning; the design forum and processes must reflect and incorporate the totality of the organization and not just its parts; goals and objectives that define the direction of the learning efforts must be formulated. Some examples of design dimensions might include the following: Is agility an integral part of ordinary work or not? Are group members from one or several functions? Are the group members from the same or different levels? Is goal setting made centrally or in the group/s? Is it process guided or free? (Shani & Docherty, 2003)

Design dimensions represent different possible ways to respond to the design requirements. Along each design dimension there is a range of choices an organizational designer can make. The conscious choices could be functionally equivalent ways to achieve the same objectives in a different context. An integral part of the rational decision making process is to identify the external and internal conditions requiring improvements in the existing agility mechanisms or the decision to create new ones; to identify the specific design requirements that fit the business situation and business dynamics; and, to investigate and explore the most appropriate alternative design dimensions for the firm.

### **2.3 Agility, Knowledge Management and Learning Mechanisms**

Members of the software development teams have access to different knowledge bases and collaborate in developing new ideas, new products, new markets, new strategies, new organizational designs, new corporate visions and the like. An integral part of software development teams' agility seems to be related to the concept of "deliberations" that take place within teams and across teams. Briefly, deliberations are reflective and communicative behaviors concerning a particular topic or issue. These are patterns of exchange and communication among people to address the topic, and may take the shape of formal meetings or informal desk-side discussions. Deliberations are not the same as discrete decisions or project milestones because they encompass informal human interactions and the ebb and flow of information related to topics over time. Completion of knowledge work tasks involves multiple deliberations. Deliberation topics, deliberation forums, and deliberation processes can all be studied in each work situation. Variables include forum membership, member contributions, coalitions, group process methods utilized, and other indicators more familiar as group and individual characteristics. (Shani & Sena, 2000)

Agility can be viewed as a central concept of organizing rather than treated as a way of organizing manufacturing, or a desired set of organizational structures (Ebrahimpur, 2002). The insights and knowledge gained in the areas of organizational learning, organizational learning mechanisms and knowledge management during the past brings agility to the center of our current understanding about organizing. Thus, agile organizations can be viewed as organizations

that posses the ability to manage and apply knowledge that exist within and outside the firm boundaries, in order to respond to expected and unexpected changes with a view of exploiting new business opportunities (Dove, 1999; Ebrahimpur, 2002; Sharifi & Zhang, 2001). In the sections that follow we advance an alternative comprehensive framework of organizational agility. The framework will be utilized to analyze a series of field studies that we conducted over a seven-year period of software development teams, computer supported technology and team performance and creativity in a division of Veritas Software (formerly a division of Seagate Corporation).

### 3. TOWARDS A FRAMEWORK OF AGILITY

In our proposed framework we identify four dimensions that affect team performance in a software work environment. Figure 1 portrays software team performance as an outcome that is influenced in a causal progression based on the firm's business environment, the agility of the firm and the software team.

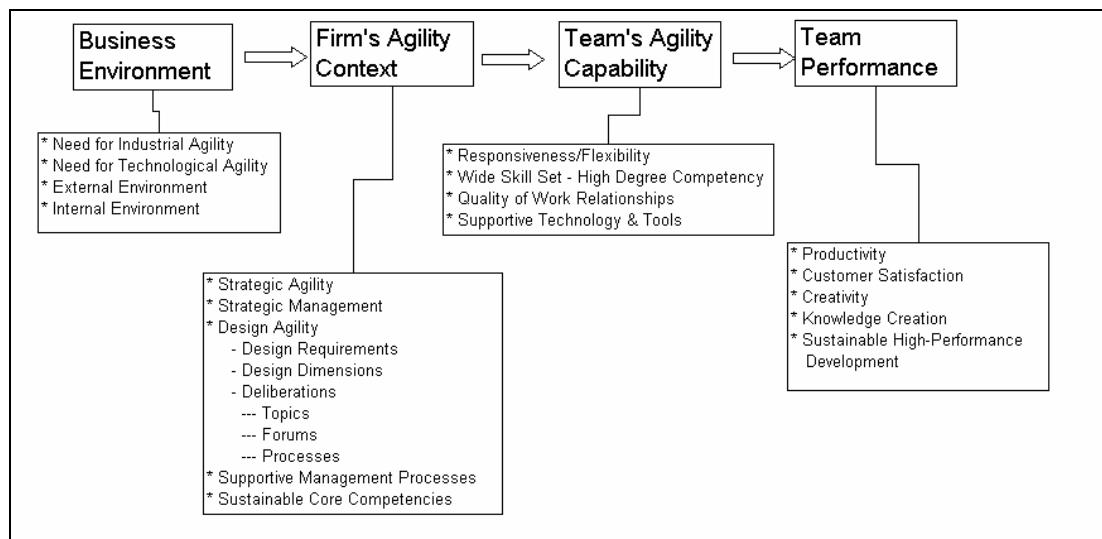


Figure 1. Agility Framework

The business environment dimension is comprised of elements and forces in the market place in which the firm competes. The firm's strategy, structure, management processes and core competencies drives the team's composition in terms of agility and related capabilities ultimately leading to and defining team performance.

#### 3.1 Business Environment

The business environment of the firm consists of all the external influences that affect its decisions and performance. Given the vast array of these influences managers cannot hope to

monitor and analyze all of these environmental conditions. Thus, a prerequisite for the firm is to be able to distinguish the vital from the merely important (Grant, 2002). For the firm to profit it must create value for customers. Therefore it needs to understand its customers. Similarly the firm needs to understand its suppliers and how to form business relations with them. Finally the ability to generate profitability from value-creating activities depends on opportunities – the firm must also understand its competitors.

By its very nature the software industry is dynamic, intolerant, and demanding. Industrial agility assumes the ability to act in a timely and proper way on new insights and, through these actions, increase the ability to react and change with little penalty in terms of time, cost or performance – i.e. flexibility (Brown, 2001; Sharifi and Zhang, 2001). Not all software firms have met these requirements. The decline of the dot coms attests to this. There are other instances as well – Hewlett Packard following its acquisition/merger with Compaq has had difficulty merging the two cultures. Today the successful software firms are radically dynamic entities – they are faced with the fact that there is no such thing as everlasting balance and equilibrium. Change management is about “agility controlled imbalance” (Emblemsvag and Brarb, 2000).

Technological agility can best be illustrated by Microsoft’s continuous ability to meet every software challenge --- Access replaced dBase, Excel – Lotus 123, Word – Word Perfect --- in the Office Automation arena, Windows NT and 2000 overwhelmed Novell in the small Local Area Network arena. In every case an established dominant market software product was virtually annihilated. In these illustrations it is important to note that the software product being replaced was not necessarily technologically inferior but instead the competitor (e.g. Microsoft) was more effective in establishing a foothold through some form of cross-software integration – the precursor to a business solution.

### **3.2 Firm's Agility Context**

Transitioning to the internal environment is the realization that strategy making is a decision-making process recognizing that strategic management fulfills multiple roles within the firm. Strategy implies the existence of some decision support mechanisms permitting the application of powerful analytical tools to help companies create and redirect their strategies and help achieve consistency in decisions. For strategy to provide such coordination requires that the strategy process act as a communication mechanism within the firm. Line managers at all levels are often given the responsibility for strategic planning.

The structure of a typical software development firm is created about cross-functional core processes rather than tasks, functions or geography. Processes include such areas as business development, software development, and technical support. Strategically the computer market has changed dramatically over the past five years. The entire technology sector of the economy has gone from thriving to chaos. Certain firm's, such as Microsoft, have managed to continue their dominance in the software part of the sector. Other giant's such as Cisco have continued their dominance (e.g. in network hardware and network operating systems) but have not experienced the continued, sustained demand for their products. However, in both cases, Microsoft and Cisco, have survived and thrived because of the firm's agility.

Structural agility implies that a firm has the ability to respond positively to, and to take advantage of, changing circumstances. This requires a different view of the business and relations with customers, suppliers, competitors, etc. beyond the conventional system of competition based on cost and quality. The emphasis is on the interface between the company and the market and the development and exploitation of inter- and intra-organizational capabilities (Dove, 1999).

To place a firm's structural design into context within the software development industry the first consideration is the alteration of strategies from product excellence to customer-focused, business solutions. A product now must meet a business need and may not have to have an all encompassing set of features. The firm must be able to cope with constrained resources—do more with less—and adapt to a mass produced set of software that will not stand-alone on a shelf in a store but instead be embedded into an organization as a solution for a business task or operation. In the software development business the insular software team is being replaced by a more dynamic, flexible arrangement of team members that still possess the skills and critical competencies, but are shifted to a close set of relationships with other parts of the organization and ultimately to the customers themselves. Supporting all of these changes is a set of management processes that are overlapping and somewhat amorphous.

The agile design relies on variety of communication forms whereby deliberations can take place—forums, topical discussions, and processes. This involves the explicit consideration of communication vehicles in a formal sense that are provided to support the software development process and to communicate with the various business units in a dynamic fashion---groupware and teamware products. Beyond these formal vehicles other mechanisms need to be in place to provide ad hoc communications—deliberations, communities of practice—ways to informally discuss ideas and relate experiences.

### **3.3 Team's Agility Capability**

Organizational change is not an issue confined to product development. In the software firm there are high levels of uncertainty and knowledge-intensive activities associated with product innovation and development (Adams, et.al., 1998). Self-directed teams, not individuals, are the basis of organizational design and performance. Process owners have responsibility for each core process in its entirety. People on the team are given the skills, tools, motivation, and authority to make decisions central to the team's performance (Daft, 2001). Team members are often cross-trained to perform one another's jobs, and the combined skills are sufficient to complete the major organizational tasks (e.g. a software product.) Teams have the freedom to think creatively and respond flexibly to new challenges that arise.

In the software industry a typical software development team could consist of a number of sub-teams such as the software engineer-developer, the quality assurance and testers, the user and customer interface and liaison, the documentation specialists, and the product managers. It is important that there be some continuity and longevity in the team to sustain high performance development. With technological innovations in hardware and operating systems, the introduction and thriving of the internet and the concomitant requirement for network-based deployment, software teams are challenged to stay state-of-the-art and to develop and maintain a wide skill set.

The era of the software developer writing code and designing systems in a cubicle or working remotely from the customer is in question. All of this aside the team still must have a quality work relationships and supportive technologies and tools.

### **3.4 Team Performance**

Customers drive the horizontal corporation which frequently categorizes firms in the software industry. Effectiveness is measured by end-of-process performance objectives – bringing value to the customer, customer satisfaction, employee satisfaction, and financial contribution. In our case as we examine the software team at various time and situational-based intervals, we see the progression to a customer-based focus.

## **4. THE CASE STUDY**

Our research describes a field study of software development teams, computer supported technology and team performance and creativity in a division of Veritas Software (formerly a division of Seagate Corporation) conducted at intervals over a seven-year period. Initially we wanted to develop a basic understanding about the nature of the division's function and performance, evolution, internal dynamics, relationship with other divisions, suppliers and customers, and; to identify the relevant key dimensions leading to an understanding of team performance and creativity in the context of groupware technology. We then endeavored to learn about managerial and team views related to the nature of the projectteam and it's sub-teams, their performance and dynamics; to learn about the dynamics between these sub-teams, and; to develop a shared interpretation of data with these sub-team. We later revisited the project team to learn about the nature of the changes that took place, the design of the software development team's work and, the emerging characteristics, processes and performance in their new work environment.

Our initial contact with the firm was just before its acquisition by Seagate as a division. This division originally was an independent company that adopted groupware software as a key work tool to support activities, especially the software production work teams. At the time of the division's acquisition Seagate was the largest worldwide manufacturer and developer of hardware and software for disk and storage management. In the first part of our study we examined the use of Lotus Notes as an instrument to manage all activities of the particular division. The second part of the study examined the collaborative features of computer-supported technologies in a software development project team at that same division. By then the division had been purchased by Veritas. We then revisited the firm after the software product had been delivered to market.

### **4.1 Business Environment – the External Context**

Seven years ago the disk storage industry had no real competitive threats. Software development for disk storage was based on technical specifications and there was very little direct contact with customers. Seagate's products were generally sold as a package of hardware and software combined. The software could also be purchased for small and medium systems at retail outlets

and through third-party providers. Overall the software industry and the technology sector was the apple of the investor's eye.

At the end point of our study the disk storage industry was faced with a variety of alternative substitutes. The market for their products had changed from a specific target (backup of local area network systems) to a variety of market targets (the local area network, the corporate network – campus intranet, the individual workstations, the mobile work force laptops and PDAs, and the home systems of the work force. In order to compete in this new market place Veritas was required to virtually cohabit with its major clients. The customer no longer wanted an off-the-shelf product but instead a business solution – an assurance that their data was safe.

#### **4.2 Firm's Agility Context**

Storage technology changed significantly over the period of the study. Software development tools though remained somewhat stable. The support apparatus for development underwent dramatic changes. Initially we viewed the firm's commitment to Lotus Notes. At that point in the study rewards, accountability and the entire product development cycle hinged about its use. Over the period of the study we saw the introduction and wide spread use of the intranet, email, messaging, telecommuting, group and team-ware products.

Since the division was our focus throughout the study as opposed to the corporate entity we regard the strategy to be that of the division not the entire conglomerate. However, it is well to note that in order to gain entry to Seagate we needed approval from the President directly – to us this was a sign of micro management. When we first viewed the division before the acquisition it was still influenced by the division's founders. Paradoxically when we initially asked for an organization chart we were told that there was none and that there were no official titles. Yet the actual structure was both traditional in terms of functional areas and the reporting apparatus was quite. Under Seagate a significant amount of autonomy was provided to the division, which was perplexing given the need for permission from the president to allow us to study the division. After being acquired by Veritas the division appeared to now function as a self-directed subsidiary. We view these changes to parallel the software industry itself over the period of our study. To survive the turbulent period a firm needed to be able to respond to a changing environment with a minimum of upper management or more specifically removed, conglomerate firm involvement. This is what has happened at Veritas.

Structurally we saw the firm change from a hierarchically and functionally based structure at the time of its acquisition by Seagate to a mission-based Dilbert-style set of cubicles with a software team organized into sub units or teams each with their specific mission. It is with this group that we have the bulk of the data in the study. At our final check point we see the movement from the sub units to a multi-task set of assignments – the software engineer, the quality assurance, the marketing staff all not only closely working together but they now customer and solution driven. The software development team has moved from the cubicle interface to the virtual team interface. To us this is somewhat reminiscent of the placement of systems engineers at major computer mainframe sites over fifteen to twenty years ago, the difference between the degree of interface of the developer with the end user/customer themselves.

Many of the management processes were either outsourced (e.g. human resources) or assumed by the corporate structure (e.g. sales and marketing). The core competencies of the software development teams were actually enhanced and became the central concern of the division. By the end of the study the actual size of the team had diminished – only partially paralleling the pattern of lay-offs in the computer industry. Care was taken to insure that the core competencies were retained.

### **4.3 Team Agility Capabilities**

We could best describe the software team's evolution over the study as moving from rigid, to mixed, to open. The team that we studied consisted of a product manager and five team managers overseeing the sub-teams of the "Salamander" Project management team, specifically managers of software engineering (engine sub teams), user interface, documentation and quality assurance, and the project manager. The sub teams varied from 6 to 9 members per group. In the last part of our study we only worked with the product manager, several team managers and a small selected group of team members.

In our examination of the project team we noted that team member relationships differed across the various sub teams. The user interface sub team recognized and relied on "topical experts" with a high degree of information sharing whereas the engine sub team shared information on 'as needed' basis. The quality assurance and documentation sub teams worked closely together. Sound team communication and dialogue were viewed as highly important. There, surprisingly, was a lack of reliance on technology to facilitate team decision-making. All of the sub teams preferred "face-to-face" communication and used email as a means of tracking the decision - making deliberation.

In the study of the project team we viewed flexibility in terms of innovation and creativity. Project management rated these very high. Surprisingly, the sub teams rated the project team's creativity as above average but not as high as that of the project manager. Team members felt that creativity could be improved by allowing individuals to discuss features and ideas that do not have an immediate application – some form of free thought. They felt that management needed to demonstrate a willingness to sponsor ideas and facilitate team member presentations of those ideas. Within the sub teams there was little variation in their assessment of sub team creativity. They noted that there was no "shortage of creative problem solving" but most implementations of these creative ideas are tempered by time and manpower constraints.

Given the rigidity of the product development cycle it might appear that the work team and individual are restricted in their responsiveness. On the contrary, teams were encouraged and challenged to come up with new ways and techniques for design and coding. Furthermore, the general orientation was to encourage the development of staff within a product group and allow cross transfer of personnel within the division.

We noted that team members were encouraged to express their views; opinions were listened to and ideas openly shared; team members are involved in the decision making process; the work group as a unit felt that the organization functions well under pressure; team members clearly

understand the group's goals and knew what things had to be done. Some reservations were expressed with respect to trust and the group's ability to meet unusual work demands. While most team members acknowledged that the workplace had a friendly atmosphere they did not feel that others took a personal interest in them.

#### **4.4 Supportive Technology and Tools**

At Seagate the division was organized into business units. Each of these business units are housed in complexes designed to minimize blocks in communication. Inherent in the structure is the inclusion of information technology threaded into the construction. Each unit has its own local area network [LAN] that was connected to the other units. Other linkages were provided by means of a common intranet. In most cases each of the development team members had from two to four workstations or personal computers for their individual work processing.

To facilitate the flow of communication Lotus Notes, as well as the Intranet, were used for Project Tracking, Sales and technical electronic filing. Microsoft outlook and messaging were used for day-to-day communication. Each production-based unit constructs a Plan of Record [POR] and placed it on Notes. The business units were allowed to self-manage. Bonuses and reward incentives were directly linked to the plan of record.

After the acquisition by Veritas the use of Lotus Notes was not required. The business team became less functional and more interactive. Based on our research finding we note overall that relevant and critical information was both available and widely shared within and between the business teams. Furthermore, discussions related to tasks and project scheduling were both clearly articulated and unambiguous. The various sub teams were very clear on their task definitions and the need to integrate and coordinate their work. With regard to the structure of the sub teams the user interface, engine and documentation teams worked in teams of 2 to 4 persons while the quality team usually worked by themselves. All but the documentation specialists were co-located. Deliberation forums were infrequent and informal for the engine (software engineer) sub teams. The other sub teams had a more formalized pattern of meetings and deliberation. For technology support the user interface sub teams need to maintain close communication with Microsoft sites. All of the sub teams cited email as their primary means of technology support. Bug tracking and source control were the other common means.

#### **4.5 Team Performance**

The "Salamander" team performance was rated "about average" by the product manager. The sub teams also rated the overall product team performance as average. However, the sub teams rated their own performance as either very high (the engine sub team) or above average. The sub teams noted that this was a "big project" and that they were working with a totally new technology. In light of these challenges they felt their performance was quite good. To move to a higher level of performance the sub teams felt they needed more resources.

In our interviews with the sub teams we noted that the linking of bonuses and incentives to documented Notes use has had a mixed reaction. Many of the staff were not enamored with the

use of Notes or other groupware products. (Over time Notes was discontinued and other more flexible but not necessarily powerful tools were introduced.) They preferred the freedom and versatility of the Intranet. Some concrete measures of performance that we viewed deal with the economic performance of the division. Starting with about 8 to 10 part-time/full-time software engineers the organization, at the time it was a division of Seagate, had grown to over 250 employees with income over \$100 million annually. By the end of the study the division, a part of Veritas, had only about 100 employees but income was approaching \$200 million annually.

We noted that there was a high degree of uncertainty connected with the integration of Seagate software with customer Products; a moderate to high uncertainty connected with the integration across different company. Locations and work driven by technology changed within the industry. Deliberation catalysts revealed pressures to hold their share of the market, a volatile, high growth industry, and high company goals and expectations.

## **5. DISCUSSION**

Many relevant issues can be discussed in the case. However, due to space limitations we will identify only few questions for further research. We advance three areas in this section, each of which requires much needed further scientific study: The scientific merit of the proposed framework for the exploration of team's agility; the interplay between firm's agility context and team's agility capability; organizational learning mechanisms and team performance.

The study of a division at Veritas Software conducted over seven year period provides initial support to the argument that agile teams can be designed, managed and redesigned continuously to meet the challenges faced in a business environment that demands agility. Design was viewed at both the firm and team levels. As was described in the case designing for agility at the firm level meant that the firms had to examine the design requirements dictated by the industrial context and, accordingly make choices about the specific design dimensions that were critical to the firm performance. Furthermore, an environment was fostered in which deliberations were encouraged in different forums and worked through a variety of processes.

The deliberations forums, one of the key findings in the case, were arenas for dialogue in which ideas were exchanged and possible actions explored. This organizational context established the foundation for work-design at the team level that by their nature were responsive and flexible with wide range of skill sets and good quality of working relationships. The seven-year study documented the continuous evolution of the teams, their context and performance. As such, the framework that we proposed (see figure 1) seems to be of value since it can help explain the complex work dynamics at any point of time as well as over a seven-year period.

The deliberation forums seem to have created the space for collective reflection and organizational learning. We view those forums as an example of organizational learning mechanism. Recently, organizational learning mechanisms were defined as "formal configurations created within the firm for the purpose of developing, enhancing, and sustaining

performance and learning" (Shani & Docherty, 2003, pp. 24). Knowledge creation, by its very nature requires time and space. Nonaka and Konno (1998) argue that by creating space ('ba' in Japanese), an organization can manage the knowledge-creating process effectively. They view 'ba' in knowledge creation as a platform (physical or virtual) where knowledge is created, shared and exploited. At the core of the forums one can find interactions between humans. Issues get identified and resolved through the interactions between individuals and the environment in which they interact. During the interaction process relationships get formed and, over time can be developed to a high quality of work relationships. The relationship, in turn, serve as the foundation around which agility can be created, developed and enhanced.

## 6. CONCLUSION

As we have seen with the utilization of the framework, the potential inherent in the designed-based approach for the understanding the complex dynamics of teams, their agility and performance within the context the firm and its environment is promising. Lifting the concept of agility from manufacturing to the team and organizational levels requires further explorations and scientific investigation. At this stage of development, the designed-based framework provides some new insights both as a one-time snapshot diagnosis and over a long-term time frame.

Organizational learning mechanisms are at the core of agility both at the firm and team levels. As we have seen at a Veritas Software Division, creating learning mechanisms by design triggers foster both agility and enhanced performance. Sustaining high performance over time is one of the major challenges that many firms face. While designing and managing learning mechanisms might be a path to explore, the complexity of agility requires continuous reflection and study with relatively little possible shortcuts in the process.

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