Effective knowledge management processes and tools in project environments

A case of Dell Computers EMEA, Business Operations PMO

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ABSTRACT

Organizations know-how and experience are great sources of valuable knowledge. The abstract characteristics of knowledge help organizations to build core competencies, however it is often not sufficiently exploited. The importance of knowledge to the overall organization is also seen in projects which are considered as temporary organizations. If knowledge is properly managed organizations may benefit in terms of decreasing repeated mistakes and creating new opportunities. However, new types of organizing in projects together with an increasing trend of geographical dispersion of workers increase the complexity of sharing and managing knowledge. Therefore, the focus of this study is to identify the processes and tools that facilitate knowledge management in the challenging environment of projects.

The theoretical framework of this study presents the characteristics of knowledge and the implications of the new forms of organizing in terms of the complexities of managing knowledge in this context. The study also approaches the specific characteristics of projects and the challenges of knowledge management. The requirements for managing knowledge successfully and knowledge management processes suggested by the authors in the field are also highlighted. Additionally, the researchers present a conceptual model for knowledge management in projects derived from the theoretical background which serves as a starting point for the empirical research.

This is a qualitative study that follows an Interpretivist research philosophy with a mixture of deductive and inductive approach. This is a case study of Dell Computers that was developed through semi-structured interviews with project managers from the project management office (PMO) of the Business Operations department dedicated to large enterprises and public sector in the EMEA region. The data collected was analyzed using a qualitative approach of data display and analysis.

The findings of the study validated the basic elements of the conceptual model for knowledge management in project environments previously suggested by the researchers. However they also suggested that the early conceptual model did not illustrate the complexity of knowledge management in projects in real life. The main findings are concerned with the different levels in which knowledge may be managed in project environments, the close relationship amongst the enablers and the ownership of knowledge management processes. In order to address those findings a new conceptual model derived from the theoretical background and the empirical research is developed.

Key Words: Knowledge, Knowledge Management, Process, Tools, Project
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CHAPTER 1

INTRODUCTION

The introductory chapter is aimed to provide the reader with the background of the subject, therefore to familiarize him/her with the topic. Research question is identified, objectives of the study defined and delimitations highlighted in this chapter. Additionally, definitions of the main concepts are offered as well as the detailed structure of the thesis.

1.1 Background of the Study


There is indeed a great untapped source of valuable know-how and experience in organizations, its organizational knowledge. It is often not sufficiently exploited and many times no one in the company even knows it exists. Just as chairman of HP stated, they don’t know what they truly know. The lack of structures for knowledge management is the reason behind this, as well as low level of managerial awareness of the importance of knowledge issues to the company performance (O’Dell and Grayson, 1998). If the knowledge is understood, stored, shared and used, the benefits for a company are enormous. Not only the number of repeated mistakes would decrease, and therefore the costs diminish, but a pool of new opportunities would open. The possibility for each employee in the organization to get the information needed, and most importantly, to get the right information, would lead to higher productivity, lower costs, higher employees’ satisfaction and it would facilitate innovation.

The highly context-specific characteristics of knowledge can be regarded as a core competence in modern companies, since it leads to building up of the competitive advantage. In that sense, knowledge is important from the overall organizational perspective as well as projects which are considered as temporary organizations (Lundin and Söderholm, 1995; Turner and Müller, 2003). The creation and exchange of knowledge are considered to be the base of projects and, as project actors gain new experiences, these should be incorporated by the organization’s knowledge base which will eventually contribute to its process of value creation. However, the new emerging organizational models coupled with the trend of geographic dispersion of the work pose great challenge to the traditional ways of sharing and managing knowledge in project environments.

People working on a project can be dispersed in different places or might speak different languages, which causes difficulties and might be impediment both to the performance of the team and to future learning from projects. These difficulties are due to the nature of the project. Within a project team there may be a number of different issues regarding knowledge management such as lack of knowledge of team mates’ previous experiences, stakeholders and crucial events, for example (Eppler and Sulowski, 2000). Additionally, after the project closure, team members either start working on another project or go back to their line function and usually the knowledge from the previous undertaking is not stored and lessons
learned not codified. Schindler and Eppler (2003) label this phenomenon as ‘organizational amnesia’.

In order to overcome ‘organizational amnesia’, appropriate knowledge management processes are to be established. In addition, knowledge enablers, such as embedded culture, organizational structure, human factor, information technology (Lee and Choi, 2003) and tools for knowledge transfer are prerequisites for successful knowledge management in an organization.

For the purpose of this study, the authors aim to identify knowledge management processes and tools for knowledge management in project environments suggested by literature and to challenge their usefulness.

Furthermore, the researchers will investigate the real-life example of Dell Computers EMEA (Europe-Middle East-Africa), specifically the Project Management Office (PMO) of Business Operations department, and compare their knowledge management process with literature’s best practices. The aim of the empirical research is to answer the research question regarding the appropriate processes and tools for managing knowledge in projects and as a result of that in the last phase of the research projects the suggested model for knowledge management in projects will be reviewed taking into account the empirical findings. Finally recommendations and suggestions would follow, helping Dell’s Business Operations PMO to better manage knowledge in the future.

1.2 Research Question

The following research question has been formulated:

‘Which processes and tools should be used to facilitate knowledge management in project environments?’

1.3 Objectives of the Study

In order to be able to analyze knowledge management processes and tools in project environments it is important to understand the bigger business picture in which knowledge is used. It is also crucial to understand the nature of knowledge and its implications for knowledge management. By doing so, the authors of this study will have more tools to assess the knowledge management processes suggested by the literature. Therefore, the initial objectives are:

1. To understand how the characteristics of knowledge influence the knowledge management processes,
2. To identify the enabling factors of knowledge management,
3. To identify best knowledge management processes and tools recommended by the literature,
Following these initial objectives, after gaining understanding of the area of study, the main objectives of the research are:

4. To develop our own model of knowledge management process based on those suggested by literature,
5. To assess Dell Computers Business Operations PMO current knowledge management practices to the model developed by the researchers,

Finally, the authors would like:

6. To bridge the gap between the academic suggestions and the real-life case investigated in order to provide recommendations for better knowledge management processes in the future.

1.4 Delimitations of the Study

This study is based on data gathered from the Project Management Office of the Business Operations department of Dell Computers EMEA. This study will focus not only on one company solely, namely Dell Computers, but also in the specific department of the EMEA region. It is therefore worthwhile stressing that the results obtained cannot be generalized across other businesses. Furthermore, this is a qualitative study made through semi-structured interviews with people working within the specific department mentioned above and thus the results may not be necessarily applicable to other areas within the organization. The aim is to answer the research question and to not to provide universal conclusions.

1.5 Definitions

This study builds on some terms that are considered to be the key words of this research. These terms will be repeatedly used during this research and thus the authors believe that it is important to establish a common understanding of their definitions.

- **Knowledge**: the definition of knowledge used in this study is the one from Nonaka et al. (1996, p. 205) “a meaningful set of information that constitutes a justified true belief and/or an embodied technical skill.” This definition is particularly suitable to this research because it takes into account physical skills and embodied knowledge which are appropriate for project environments and especially for an IT manufacturing company such as Dell Computers.

- **Project**: Projects have been defined in a number of ways in the literature. The common features usually identified in all definitions is the triple constraints of time, cost and quality, the uniqueness and the fact that projects are timely bounded. For this study, the authors use the definition of Turner and Müller (2003, p. 7) “A project is a temporary organization to which resources are assigned to undertake a unique, novel and transient endeavor managing the inherent uncertainty and need for integration in
order to deliver beneficial objectives of change”. The authors of this study think that this definition goes beyond the nature of projects by also mentioning the outcome, “beneficial objectives”. This definition also takes into account the uncertainty that surrounds projects as well as brings the need for integration of resources which is in line with the knowledge management topic approached in this study.

- **Knowledge Management**: the notion of knowledge management used in this study is drawn from Gupta *et al.* (2000, p. 17) definition as follows “Knowledge management (KM) is a process that helps organizations find, select, organize, disseminate, and transfer important information and expertise necessary for activities such as problem solving, dynamic learning, strategic planning and decision making.”

- **Process**: the concept of process that underlies this study is rooted on the following definition, process is “a sequence of individual and collective events, actions, and activities unfolding over time in context” (Pettigrew, 1997, p. 338).

### 1.6 Structure of the Thesis

This thesis is structured in five chapters. The first chapter is **Introduction**, providing reader with the background of the subject, main objectives of the research, its delimitations and definitions of main concepts in the field. In order to deeper understand these topics the next chapter will present a **Literature Review** where the topics will be ordered from a broader business context to more project specific setting. The first section will discuss the importance of knowledge in new forms of organizing. The second section will present the definition of knowledge and its characteristics. The aim of the third section is to provide a definition and the characteristics of projects and also to discuss the complexities of managing knowledge in this context. The fourth section will approach the challenges of knowledge management in organizations and projects. The following section will discuss the requirements for successful managing of knowledge. This will lead to the next section which will discuss a number of knowledge management processes suggested by the literature. Additionally, authors’ own model for knowledge management in projects is presented and will serve as a starting point for the empirical part of this research. The following picture presents the topics discussed in literature review moving from broader to more context specific issues.
The third chapter of the thesis is addressing Research Methodology. Both theoretical and practical methodologies are described within this chapter. The first one is related to the research philosophy definition, as well as research approach and strategy presentation. On the other hand, practical methodology part is providing reader with authors’ reasons for the choice of the subject, data collection methods, interviewee information and other relevant topics. The next chapter presents Findings and Discussion of the research with authors’ attempt to analyze and explain the results of the study. Furthermore, the revised model of knowledge management is presented in this part, as the final result of the research. Finally, Conclusions and Recommendations chapter is offering final comments and indicating possible areas for further research. The following figure illustrates the structure of the thesis.
Figure 2: Structure of the Thesis
CHAPTER 2

LITERATURE REVIEW

Literature review is offering evaluation of the well respected research papers and books in the area of the study. Topics are presented from a broader business context to more project specific setting, in order to provide the reader with the sequential familiarization with the topics. Therefore, the chapter is divided in six sections. The first section (2.1) will discuss the importance of knowledge in new forms of organizing. The second section (2.2) will present the definition of knowledge and its characteristics. The aim of the third section (2.3) is to provide a definition and the characteristics of projects and also to discuss the complexities of managing knowledge in this context. The fourth section (2.4) will approach the challenges of knowledge management in organizations and projects. The following section (2.5) will discuss the requirements for successful managing of knowledge. This will lead to the section (2.6) which will discuss a number of knowledge management processes suggested by the literature. Additionally, authors’ own model for knowledge management in projects is presented (2.7).

2.1 Knowledge as a Core Competence for Sustainable Advantage

The business environment has passed through severe changes, especially during the decades of 1980’s and 1990’s. Globalization has pressurized firms to shift their goals from economizing to adding value (Pettigrew and Massini, 2003, p. 8). These changes have had impact in the forms of organizing, in the relationships between companies and, most importantly, in the strategic thinking. The intense global competition, the decreasing customers’ loyalty, and the hard economic and industrial growth have stimulated the companies to seek and maintain competitive advantages. In the last decades, strategy practice and research has been heavily influenced by the SWOT framework coupled with Porter’s ‘five forces’ model (Porter, 1980). These models attempt respectively to analyze a firm's internal capabilities (strengths and weaknesses) in comparison to the opportunities and threats of its competitive environment, and to evaluate the forces in an industry that give rise to opportunities and threats. According to Porter’s perspective, a company’s performance basically relies on three generic strategies: low cost, product differentiation or market niche (Porter, 1885). However, this approach has been recurrently criticized by those that understand that it places too much emphasis on the industry as a whole and does not appreciate the firm’s particular characteristics in terms of excelling on business performance (Teece, 1991; Zack, 1999). As an answer to that issue, the resource-based-view (RBV) of the firm has been introduced (Barney, 1991) which suggests that firms should position themselves strategically based on their resources and capabilities rather than the products and services derived from those capabilities. The RBV’s underlying assumption is that “while products and markets may come and go, resources and capabilities are more enduring” (Zack, 1999, p 127).

From the RBV standpoint, the resources and competences of an organization are the strategic capabilities needed to survive and prosper in the market place. However, the objective of firms should not only be to survive, but to achieve and sustain competitive advantage through their core competences. Johnson et al. (2008, p. 97) define core competences as “the skills
and abilities by which resources are deployed through an organisation’s activities and processes.” This definition of core competences builds on Barney’s (1991) criteria of capabilities able to create sustainable advantage. He argues that for firms to gain and maintain sustainable competitive advantage these resources must be valuable, rare, inimitable and non-substitutable. Similarly, Aaker (2001) suggests a strategic initiative turns into a competitive advantage when it is highly valued by consumers and it cannot be easily copied by the competitors. Walker et al. (2008, p. 1) highlight that “value is in the eye of the beholder” and that firms should carefully evaluate who has a need that requires satisfying or addressing and which exactly are the priorities of this important stakeholder. The concept of rarity involves uniqueness of capabilities and how difficult it may be to transfer it to another firm’s context. Finally, capabilities must be inimitable, in other words they should be strongly linked to firm-specific aspects, such as culture and history for example.

Researchers have argued that an organization’s core competences lay at its centre (Prahalad and Hamel, 1990). Having a high potential for inimitability and rarity, intangible resources such as the firm’s knowledge have become increasingly acknowledged as having great strategic importance. Damm and Schindler (2002, p. 37) define knowledge as “information embedded in a certain context that becomes applicable by human agents and has potential impact in future decisions”. Knowledge tends to be context-specific and it is embedded in complex organizational routines and developed from experience. Zack (1999, p.128) correctly differentiates knowledge from traditional organizational resources in the sense that “it is not easily purchased in the marketplace in a ready-to-use form”. From this perspective, the companies’ knowledge is considered to be a significant source of advantage for organizations as each company creates its unique knowledge according to its people, structure, culture, history and industry. Strategy initiatives are embedded in particular types of structures and they are surrounded by signals, symbols, relationships and knowledge which has significant implications for strategy outcome.

According to several researchers (Liebeskind, 1996; Nahapet and Goshal, 1998; Johnson et al., 2008), the particular ways in which a firm facilitates and manages its knowledge, both institutional and practical, plays an important part in its long-term capability to achieve sustainable competitive advantage. Nahapet and Goshal (1998) emphasize the process of organizing the social and intellectual capital pointing out that they can together create organizational advantage. Similarly, Liebeskind (1996) suggests that the existence of appropriate systems to capture and routinize tacit and private information is crucial to transform it in a core organizational capability. The structuring of job roles is also central to guarantee the desired level of interpersonal and cross-departmental interaction required for creating a flow of knowledge that promotes learning, innovation, exchange and joint problem-solving.

The importance of knowledge management may be viewed in a larger business context as Brown and Duguid (1998, p. 91) state that “all firms are in essence knowledge organizations”. Knowledge is considered to be the basis on which firms take informed actions and its absence implies that firms’ actions are merely a reflex to external changes rather than intentional plans (Ekstedt et al., 1999, p. 124). Their ability to outperform in the marketplace rests in the continuous generation and synthesizing of knowledge.” To this end, many firms have included knowledge management as a business priority and have created a range of knowledge management projects and programs. Likewise, knowledge has been subject of extensive studies in the management field lately originating a number of researches concerned with topics such as the nature of knowledge, organizational learning, and firms’ knowledge strategy. Some of these topics will be reviewed in the following section.
2.2 The Nature of Knowledge

Knowledge is a rather abstract concept that is related to individual learning as well as social and cultural contexts. According to Ekstedt et al. (1999, p. 125) knowledge is influenced by behavior, implicit and explicit norms and interactions. The definition of knowledge used in this study is the one from Nonaka et al. (1996, p. 205) “a meaningful set of information that constitutes a justified true belief and/or an embodied technical skill.” This definition is particularly suitable to this research because it takes into account two important elements of knowledge (i) physical skills and (ii) embodied knowledge which are appropriate for the context of this research.

Depending on the way it is created and the possible ways of expressing it, knowledge can be defined as tacit and explicit. The majority of academics agree on the this issue and further associate codification knowledge management strategy to explicit knowledge transfer and personalization strategy to tacit knowledge exchange.

Tacit knowledge is related to personal observations, thoughts and ideas, that cannot be easily exchanged with other people through words (Nonaka, 1991). It influences one’s way of perceiving the world and is somewhat individual. However, according to Koskinen et al. (2003), tacit knowledge can be transferred by using metaphors, drawings and other means.

Explicit knowledge, on the other hand is clearly expressed in words, formulae or in any other way and can be easily exchanged through formal processes.

According to Takeuchi and Nonaka (2004), knowledge cannot be defined as either one or the other, since it has elements of both. That is why authors conclude that “knowledge is inherently paradoxical” (p. 4). They introduce the process of ‘change’ from one type to another, which is represented with SECI process (socialization, externalization, combination and internationalization).

**Tacit to tacit (socialization)**

Tacit knowledge can be transferred to other person in a form of a craft through experience, since it is related to practice, not theory. However, having in mind modern organizational context, if the knowledge doesn’t take an explicit form, “it cannot easily be leveraged by the organization as a whole” (Nonaka, 1991, p. 99).

**Tacit to explicit (externalization)**

When tacit knowledge is articulated and expressed, it becomes explicit. Nonaka and Takeuchi (2004) argue that metaphors, models and analogies are useful for transferring knowledge from tacit to explicit. Koskinen et al. (2003) however pay special attention to metaphors and argue that through them, people express their knowledge in a new way and thus articulate what they cannot say.

**Explicit to explicit (combination)**

Explicit knowledge can be transferred to explicit by collecting and synthesizing existing knowledge. In an organizational context, the exchange can occur through documents, conversations, both telephone ones and face-to-face and through other means.
Explicit to tacit (internalization)

If articulated knowledge is used for further mental processes by an individual, it becomes tacit again. According to Nonaka and Takeuchi (2004) internalization is related to ‘learning by doing’.

Nonaka (1991) argues that all four directions exist in a knowledge creating company. Moreover, Takeuchi and Nonaka (2004) define different actors in levels of knowledge. They suggest that socialization process is between two individuals, externalization is transfer from individual to group, combination, group to organization, internalization organization to individual.

In line with Takeuchi and Nonaka (2004), Koskinen et al. (2003) also suggest existence of both ‘types’ of knowledge. They define knowledge of an employee - team member by recognizing tacit and explicit knowledge and personal characteristics, that differ between individuals. These three lead to personal competences of a team member and as such influence his/her task execution in a team.

Related to tacit and explicit knowledge, personalization and codification strategies can be distinguished. Codification strategy is obviously used for transfer of explicit knowledge. It “centers on the computer” (Hansen et al., 1999, p. 107) with knowledge placed and stored in databases, where all the employees in a company can access the information. It is defined as a people-to-document approach, where people store information in a computer system. The successful utilization of codification system requires investments in IT, which vary depending on the level of complexity needed. However, “while codification may be an efficient strategy for transmitting a large amount of information, it does not allow interactions and customization of solutions to the knowledge seeker’s problems” (Boh, 2007, p. 30). In general, academics argue that if company produces standardized product, mature product with employees relying on explicit knowledge, codification strategy is to be pursued.
Personalization strategy is diametrically different approach, where tacit knowledge is transferred through personal contact among employees, or through telephone conversations, e-mails and video conferences. Computers are used in this case to “help people communicate knowledge, not to store it” (Hansen et al., 1999, p. 107). Conversations between employees can transfer more information, “including facial expressions and voice inflections” (Pretorius and Steyn, 2004, p. 42), as well as body language. Accordingly, this way of knowledge transfer is more *ad hoc* and less formal (Boh, 2006, p. 27). Moreover, the knowledge exchanged in person-to-person manner sometimes might not be codified and transferred in a different way. In the case of customized products, innovative products and mainly tacit knowledge creation, personalization strategy is recommended. However, the transfer of knowledge through personalization strategy cannot include as many employees as codification approach can.

The company’s choice of a strategy depends on many internal factors, such as organization’s way of doing business, its relation to the customer, its values and embedded culture etc. More precisely, the decision is influenced by company’s competitive strategy. According to Hansen *et al.* (1999), the choice between codification and personalization strategy is the most important decision in the knowledge management field. In addition, Hansen *et al.* (1999) argue that the combination of two strategies, having main strategy and supportive one, being named ‘focused’, is a good approach to the problem. They suggest the 80%-20% split between the two and warn that if companies try to simultaneously follow both strategies with equal importance, efforts might be useless. On the other hand, Bierly and Chakrabarti (1996) and Zack (1999) argue for balance between the two approaches, in order to be more profitable.

The authors of this study believe that Hansen *et al.* approach is more appropriate one, leading to focus on one strategy and pursuing it fully and properly. Since organizational cultures and contexts differ, each company should choose a knowledge management strategy that suits it best, taking into account information technology development, strength of interpersonal relations and other factors.

In the discussion on codification vs. personalization strategy, Boh (2007) comprises the notion of individualized vs. institutionalized mechanisms, as different tactics that organizations use to involve employees in knowledge management processes. According to the author, individualized mechanisms are related to individuals in an organization and their own knowledge sharing activities, whereas institutionalized systems include whole organization and its culture, routines and systems. In this way, Boh (2007) distinguishes four possible combinations: individualized-personalization, individualized-codification, institutionalized-personalization, institutionalized-codification.

Individualized-personalization model is based on individual-to-individual information exchange, with personal initiatives from employees to transfer data to other people in an informal way. Institutionalized-personalization, on the other hand is person-to-person approach, where the motivation for knowledge transfer comes from organizational culture and it is usually related to larger or dispersed companies, that need well-established knowledge management structures. Individualized-codification approach is individual-to-individual exchange of documentation. Finally, institutionalized-codification mechanism is transfer of documents that is empowered by organizational culture of a large organization.

The table below summarizes explanations provided by Boh (2007) regarding differences between the mechanisms, with authors’ own reflections added.
Table 1: Personalization-Codification vs. Individualized-Personalized Knowledge; adapted from Boh (2007, p. 36)

<table>
<thead>
<tr>
<th>Personalization</th>
<th>Institutionalized</th>
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<td><strong>Individualized-personalization</strong></td>
<td><strong>Institutionalized-personalization</strong></td>
</tr>
<tr>
<td>mechanism</td>
<td>mechanism</td>
</tr>
<tr>
<td>-individual level, informal</td>
<td>-embedded in the culture, routines and systems of organization/ in large and geographically dispersed organizations</td>
</tr>
<tr>
<td>-person-to-person</td>
<td>-person-to-person</td>
</tr>
<tr>
<td>-customized products</td>
<td>-customized product</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Codification</th>
<th>Institutionalized-codification</th>
</tr>
</thead>
<tbody>
<tr>
<td>mechanism</td>
<td>mechanism</td>
</tr>
<tr>
<td>-individual level, informal</td>
<td>-embedded in the culture, routines and systems of organization/ in large and geographically dispersed organizations</td>
</tr>
<tr>
<td>-exchange of information and documents through system</td>
<td>-exchange of information through system</td>
</tr>
<tr>
<td>-standardized product</td>
<td>-standardized product</td>
</tr>
</tbody>
</table>

As a conclusion to the theoretical framework on nature of knowledge, the authors of this research have developed a summarizing graph which encompasses explicit and tacit knowledge, knowledge management strategies and respective means of communication. It can be noticed that while moving on the explicit/tacit knowledge arrow, knowledge management strategy is changing from codification to personalization, since tacit ideas are hard to codify. Similarly, as the knowledge is becoming more tacit, means of communication tend to turn into less formalized, non-numeric, but rather more personalized.

Figure 4: Knowledge Management Strategies vs. Knowledge Types vs. Means for Knowledge Transfer; developed from Koskinen et al. (2003, p. 286)
As discussed before, knowledge is of fundamental importance for organizations in terms of taking informed actions and building advantages. However, as seen in this section, its abstract characteristics and its many ways of representation pose a great challenge to organization in terms of handling knowledge. According to Ekstedt et al. (1999, p. 125) that challenge is even harder when it comes to projectised activities, that have great capacity for knowledge formation, but face difficulties in grasping this knowledge and transmitting the outcome to future activities. This topic will be discussed in the section that follows.

2.3 Projects, Dispersed Teams and Knowledge Management

In the new business world, changes pressurize organizations to find more effective ways of doing business and time is becoming a critical factor of success. As firms face the challenge of blending speed with direction, creativity with control and flexibility with structure, an increasing number of organizations shift from the traditional structures to decentralized and flat hierarchies. A review of the literature reveals that several researchers have considered ‘project’ an efficient way of bridging the gap between strategy formulation and implementation in today’s fast paced business world (Partington, 2000; Gardiner, 2005; Gray and Larson, 2008). According to Gray and Larson (2008, p. 10) project “is rapidly becoming a standard way of doing business”. Projects are commonly defined as a temporary endeavors with distinct life-cycle phases that has as output unique products and services (for example PMI, 2004; Damm and Schindler, 2002; Gardiner, 2005).

The debate on project management origin has led to the consensus among academics that it was initially used in the construction industry and in the defense sector. These are the fields that experienced the need for project organization long time ago, due to the nature of the work. However, Kerzner (2003, p. 47) argues that by the last decade of the 20th century, organizations have become fully aware of project management benefits and started realizing that project management is a necessity, not a fad. Even companies that were not aware of using projects, did actually use them. Other way of doing business, which was widely used before organizations started applying projects, is performing routine operations in organization. In some organizations this approach can be successful, but most businesses need to embrace project approach in order to manage changes both within and outside the organization.

According to Turner and Müller (2003), projects are unique, novel and transient endeavors. As Gardiner (2005, p. 129) suggests, all the team members are responsible to project manager who coordinates and controls the process. They are dedicated and loyal to the project or product they are working on and therefore highly motivated. Communication is present within a group and decision-making process is thus quicker and simpler. Moreover, project managers are somewhat independent in doing their work, they control budget and they are full-time employed on a project (PMI, 2004, p. 29).

Schindler and Eppler (2003) argue that the projects are suitable for learning. The authors of this research endorse this, but challenge the statement if it is to be compared with other ways of doing business in organizations, since it is believed that the nature of project leads to fewer amount of knowledge storage. Due to the above stated characteristics of projects, there are numerous implications on knowledge management field in any organization that pursues projects, as compared to the non-project oriented companies (Ekstedt et al., 1999). One
example of implications would be the fact that projects are time bounded and thus there is an urgent need for a knowledge management process that immediately captures the relevant knowledge generated by it. Another important aspect is the loose forms of organization that projects may assume with less rigid hierarchy and often with team members located in different sites around the globe which makes knowledge management processes even more critical and also more complex.

In that context, people working on a project can be dispersed in different places or they might speak different languages, which causes difficulties and might be impediment to future learning from projects. Additionally, after the project closure, team members either start working on another project or go back to their line function and usually the knowledge from the previous undertaking is not stored and lessons learned not codified. Schindler and Eppler (2003) label this phenomenon as ‘organizational amnesia’. They explain four main reasons for this condition, namely, time, motivation, discipline and skills. As mentioned earlier, the time constraint is embedded in the nature of projects, thus after finishing project the team is being appointed for other tasks and doesn’t have enough time to reflect, evaluate and store knowledge. Motivational factor is explained by Schindler and Eppler (2003) as employees reluctance to learning from mistakes. Therefore, as Kasvi et al. (2002) suggest, team members should be motivated to create and store lessons learned after the project closure. The question that further arises is when should the learning process start. It might be too late to start with knowledge management after the project has finished. Schindler and Eppler (2003) suggest that learning should not be pursued only after the project closure, but continuously during the project, through regular reviews. This is especially applicable in long projects that need continuous learning during progress in order to correct mistakes and realize potential opportunities. Koskinen et al. (2003) argue that it is more important in project context to find and use knowledge that already exists than to deal with solving problems without insight to knowledge that is yet available in the organization. Additionally, the authors stress that in practice people mostly prefer seeking information through person-to-person contact. Team members ask other employees for advices rather than referring to documentation, therefore mutual trust among employees is a significant factor.

The extensive literature regarding project management agrees that project is a knowledge-intensive task (Damm and Schindler, 2002; Pretorius and Steyn, 2005; Koskinen, 2004). The creation and exchange of knowledge are considered to be the base of projects and, as project actors gain new experiences, these should be incorporated by the organization’s knowledge base which will eventually contribute to its process of value creation. However, the new emerging organizational models coupled with the trend of geographic dispersion of the work pose great challenge to the traditional ways of sharing and managing knowledge. Therefore, the organizational mechanisms supporting knowledge management across project teams deserves special attention.

Corso et al. (2006, p. 583) explain the challenge posed by new characteristics of organizing with regards to knowledge management in two ways: scope dispersion and contractual dispersion. The first describes the fact that today in the companies people tend to be assigned to different multi-disciplinary teams, they are subjected to job rotation or they spend a large part of their time working remotely (visiting customers and suppliers for example). In other words, a growing number of employees spend their working hours outside the physical boundaries of their companies, therefore they have limited contact with the physical context of the organizational culture and reduced exposure to peers who perform similar activities and with whom it would be possible to share relevant experiences. Similarly, Lindkvist (2005, p. 1189) points out that projects put together individuals with highly diverse skills who
have to solve problems in tightly time limits which may result in less developed groups in terms of shared knowledge and understandings. Secondly, the growing trend of partnerships and outsourcing results in loose links between firms and people which are temporarily and only partially involved with each other.

In this context, a proper knowledge management system seems to be useful from the perspective of both the organization and the geographically dispersed employee. From the organization’s standpoint, a large amount of valuable information and knowledge is gathered in the employee’s hand every time this person is assigned to a different project and thus it is crucial to collect, store and re-use the relevant know-how in future businesses. Organizations that understand the potential of the individuals’ knowledge for value creation face knowledge management as a strategic initiative. It is of the best organizational interest to capture all the knowledge possible from its people, interactions and experiences. On the other hand, it is of the interest of the dispersed worker to absorb the knowledge that the firm might encapsulate. This type of worker is usually more autonomous and proactive than regular in-house workers. Due to his distance from the firm and/or his co-workers, he cannot rely on formal and informal organizational environment and social interactions. Instead, dispersed workers may see knowledge management systems as a critical tool for their learning and ultimately their professional growth.

It is part of our common-sense assumptions that face-to-face interactions are more effective than any other kind in terms of knowledge sharing potential. Gupta et al. (2009) claim that transferring of knowledge between individuals and firms benefits from co-location and conversely physical distance is detrimental to inter-personal and inter-organizational collaboration. However, these authors also acknowledge that face-to-face interactions may have some drawbacks such as the inability of several members of a group to contribute simultaneously which may restrict one’s interaction with the group reducing the effectiveness of the sharing process. On the other hand, dispersed teams have to achieve a certain level of relationship and group performance without opportunities for interactions in person. Instead, they have to build virtual networks through means that often do not allow synchronous communications.

Recent advances in information technology have facilitated knowledge work of geographically dispersed teams without meeting face-to-face. The widely-spread use of desktop computers, laptops, mobile phones with internet access and video-conferencing are good examples of alternative tools of knowledge sharing. Gupta et al. (2009, p. 148) introduce the concept of ‘virtual teams’ and describe distributed teams as “groups of workers who are geographically and temporally dispersed and are assembled via technology to accomplish an organizational task.” Despite the great technological advances towards bridging the gap of face-to-face interactions, virtual communication cannot replace ‘in person’ meetings in terms of knowledge sharing. The downside of virtual means of communication is specially related to the nature of knowledge that it is likely to share. The tools of communication mentioned above are mainly based on written expression which enables transferring of explicit knowledge, but fails in transmitting underlying assumptions or unspoken rules, the tacit knowledge.

Hambley et al. (2007) classify the communication mediums in dispersed teams as synchronous and asynchronous. Synchronous mediums allow team members to interact in real time working on the same activity with the level of information, this includes chat, video-conference, live-meeting applications. Conversely, in asynchronous mediums the team members communicate in different times, which is the case of e-mails, blogs and repositories.
for example. Hambley et al. (2007) suggest that a rich communication medium allows for use of multiple verbal and nonverbal cues, use of natural language, immediate feedback, and expression of personal feelings and emotions. However, it is important to highlight that both synchronous and asynchronous mediums of communication seem to have benefits and drawbacks in the process of knowledge sharing according to the nature of knowledge, the profile of the project team and the culture of the organization. For example, the use of synchronous mediums may facilitate the communication of strategy and expectations, decision-making and increase the group’s involvement and commitment. But, it may not be as effective as asynchronous mediums when the objective is to keep historical data.

In conclusion, the effectiveness of knowledge sharing in geographically dispersed teams is not a matter of choosing one or the other kind of communications mediums, but to acknowledge the need of extra effort towards knowledge management not otherwise needed in traditional structures and to establish a process that guarantees a two-way communication flow between the individuals and the organization which will be supported by a number of different means of communication that will cover different types of knowledge and interaction styles.

2.4 Impediments for Knowledge Sharing: Knowledge Stickiness

The increased levels of information promoted by management methods such as TQM, benchmarking and process reengineering have illustrated some important ‘disparities’ of performance of different departments or sub-units (Szulanski and Jensen, 2006). The internationalization of organizations has added extra complexity to these comparisons (Adenfelt and Lagerström, 2006). Although companies with geographically dispersed sub-units should utilize guidelines given by the parental organization, the physical distance, local market context and cultural differences influence the sub-unit’s practices which may eventually differ in a positive or negative way from the parental organization and the other sub-units. Szulanski and Jensen (2006, p. 937) claim that “some degree of adaptation almost invariably accompanies the cross-border transfer of firm-specific practices”. As a result of that, transferring of internal best practices has increasingly gained attention from managers and academics and it has been as one of the most important and widespread management issues of the late 1990’s (Szulanski, 1996; O’Dell and Grayson, 1998; Bresnen et al., 2003).

The process of transferring consists in the replication of an internal practice that is performed in a superior way in some part of the organization and is deemed superior to internal alternate practices and known alternatives outside the company (Szulanski, 1996; O’Dell and Grayson, 1998). The definition of practice refers to organizational routine which in turn is the source of organizational knowledge. These routines are the representation of a network of consistently coordinated resources, relationships and interactions. Thus, “leveraging knowledge assets entails re-using knowledge embedded in a set of routines, in a different geographic location in order to magnify the benefit of existing knowledge” (Szulanski and Jensen, 2004, p. 348).

The definition of projects as temporary organizations (Lundin and Söderholm, 1995; Turner and Müller, 2003) allows us to apply the concept of knowledge management in project level. Furthermore, the extensive literature regarding project management agrees that project is a knowledge-intensive task and therefore the nature of knowledge and means of knowledge transfer may well prove useful in terms of improving the triple constraints of cost, time and scope (Pretorius and Steyn, 2005; Koskinen, 2004). Project teams are assigned to a number of different projects and interact with various segments of the company, suppliers, partners and
other stakeholders, and as such they acquire a set of skills, capabilities and information that could be highly valuable for future projects and the company as a whole. Additionally, Sapsed et al. (2005) state that a project is considered as connections around specific activities that brings together a range of resources that interact in a temporarily-bounded manner. Many researchers of management agree that spatial proximity may bring several advantages for communication and coordination, however in the case of projects the spatial configuration is not rigid as this type of activity heavily relies on specialist knowledge and expertise that may be distributed across different locations or companies in the case of a multi-site organizations or outsourcing. Thus, knowledge management in dispersed project teams becomes particularly complex.

Several authors from the management field have indicated that knowledge transfer within an organization or within a project team is considered to be much easier than between firms for obvious reasons such as less confidentiality issues and legal obstacles, absence of competition, and especially in the case of projects the existence of common objectives. However, Szulanski’s (1996) ‘seminal work’ on knowledge transferring introduces the concept of knowledge stickiness suggesting that transferring of knowledge within a firm is far from easy. This concept is based on the idea that knowledge management in a firm’s context should not only promote the creation of knowledge, but most importantly, it should be concerned with its effective transfer for further use. However, as mentioned before knowledge is highly context specific and it tends to stay attached, or as Szulanski expresses it tends to ‘stick’ to the person or group of people who generated it. Following Szulanski’s (1996) research, the concept of knowledge stickiness has been widely accepted in knowledge management research (for example Bresnen et al., 2003; Szulanski and Jensen, 2004; Adenfelt and Lagerström, 2006; Derek and Rowlinson, 2008; Zhao and Anand, 2009). In line with this idea, Inkpen (2008, p. 451) states that “socially embedded knowledge that is highly context specific and systemic does not move easily.”

Firms trying to transfer knowledge for future re-use may encounter several problems related to the nature of knowledge, firm’s structure, means of transferring and employees behavior, for example. Szulanski (1996) has analyzed this issues from the process perspective and has identified several problems as the transferring process unfolds. Similarly, Eppler and Sukowski (2000) also approach the problems related to knowledge transferring. However, these authors analyze it from a slightly different point of view that seems to be complementary to Szulanski’s perspective. Eppler and Sukowski observe this issue to from a managerial standpoint pointing out that any model put in place should avoid a proposed set of problems at the team level. The two tables below summarize the concerns of firms when transferring knowledge internally from both perspectives as mentioned previously:
Firms’ concerns when transferring knowledge, Szulanski (1996, p. 30)

<table>
<thead>
<tr>
<th>Phase</th>
<th>Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation phase</td>
<td>How to identify knowledge need? How to find knowledge that meet that need? How to assess the feasibility of the transfer?</td>
</tr>
<tr>
<td>Implementation phase</td>
<td>Problem will reflect the effort to bridge the communication gap between source and recipient or to adapt the best practice to the recipient context?</td>
</tr>
<tr>
<td>Ramp-up phase</td>
<td>Problems reflect the struggle to achieve satisfactory performance.</td>
</tr>
<tr>
<td>Integration</td>
<td>Problems reflect the efforts to achieve and preserve routine use of the new knowledge in the recipient.</td>
</tr>
</tbody>
</table>

Table 2: Firms’ Concerns When Transferring Knowledge, adapted from Szulanski (1996, p. 30)

<table>
<thead>
<tr>
<th>Problems to be avoided (Eppler and Sukowski, 2000, p. 335)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Team members are not aware of previous experiences of their team mates or their special skills.</td>
</tr>
<tr>
<td>• New team members who join an existing team are not aware of crucial events (and subsequent learning) that happened prior to their arrival in the team.</td>
</tr>
<tr>
<td>• There is a lack of knowledge about stakeholders and their goals in respect to the team’s work.</td>
</tr>
<tr>
<td>• Knowledge that individual team members acquire externally or develop themselves is not sufficiently shared with other team members.</td>
</tr>
<tr>
<td>• Collective knowledge creation is often difficult due to time, language or co-ordination problems.</td>
</tr>
<tr>
<td>• The teams does not gather and combine their insights into the overall process systematically and does not deduce lessons learned for future activities.</td>
</tr>
</tbody>
</table>

Table 3: Problems to be Avoided Considering Knowledge, adapted from Eppler and Sukowski (2000, p. 335)

Although the list of topics of concern presented on the tables above seem to be rather comprehensive, it also illustrates that there seems to be a lack of consensus between practitioners and academics regarding the factors that make knowledge ‘sticky’ and thus the internal knowledge transfer difficulties. Conventional wisdom usually blames motivational factors or individual agendas. When practitioners are to explain the difficulties of internal knowledge transfer, they typically refer to internal competition, inter-personal or interdivisional jealousy, lack of incentives, lack of confidence, low priority, lack of buy-in, inclination to reinvent the wheel, recipients’ refusal to do exactly what they are told, resistance to change, lack of commitment (Szulanski, 1996). Szulanski (1996) suggests four set of factors that comprehend the attributes of knowledge as well as the context as possible root causes of knowledge stickiness (summarized in the table below):
The root-causes and factors presented on the table above were subject to a research consisted of 271 observations of 122 best-practice transfers. Szulanski’s findings led him to conclude that knowledge-related factors are the major barrier for internal knowledge transfer, especially Lack of absorptive capacity of the recipient, Casual ambiguity and Arduous relationship, which contradicts the common sense that placed much attention to motivational factors. Similarly, Inkpen (2008) stresses that the recipient’s failure in understanding cause-effect linkages is a significant barrier for knowledge to be internalized. On the other hand, Zhao and Anand (2009) emphasize the level of transfer difficulty related to collective versus individual knowledge. They point out that knowledge is predominantly implicit and embedded among the norms and routines of multiple organizational members and the general lack of emphasis on collective teaching and learning among multinationals is the reason for poor internal knowledge transfer.

Nevertheless, it is also important to discuss the dynamics of knowledge transfer and highlight the paradox posed by knowledge management. On one hand, companies may seek to minimize knowledge stickiness by implementing a set of routines supported by tools for managing knowledge in order to build organizational advantages based on positive and negative experiences. On the other hand, the overemphasis on formalized knowledge management processes may represent a risk to innovation and experimentation limiting the organizational potential for learning. Inkpen (2008) claims that “experimentation is also necessary to build a continuous learning process.”

Anyhow, it may be argued that systematic implementation of knowledge transfer mechanisms may help organizations to mitigate the stickiness of knowledge in order to facilitate organizational learning and thus gain better performance (Eppler and Sukowski, 2000;
Szulanski and Jensen, 2006; Inkpen, 2008). The effort for facilitating organizational learning may involve a number of different initiatives. Some companies may choose to hire people with strategic experience for example, but it is important to remember that knowledge is highly volatile and appropriate organizational tools should be put in place in order to capture it and re-distribute it strategically for future re-use. The next section will review enablers of knowledge management which may include, but should not be limited to structure, culture, people, specific tools and technologies, routines, and networks that combine people, tools, and routines. According to Szulanski (1996, p. 30) “...an organization equipped with effective routines to handle all aspects of a [knowledge] transfer is unlikely to consider that transfer sticky.”

2.5 Knowledge Management Enablers

In order to overcome knowledge stickiness and to let knowledge be created and shared in an organization, companies may undertake different actions, depending on available means and characteristics of the specific situation.

Researchers have defined different enablers that may help in knowledge transfer; Lee and Choi (2003) distinguish social and technical enablers. They argue that social enablers are culture, organizational structure and human factor, while technical enablers are related to information technology. Although Lee and Choi (2003) present a fairly complete set of enablers of knowledge creation, the authors of this research believe that their framework lacks the tools that support collection, storage and sharing of knowledge. These tools are considered knowledge management solutions which are vital for translating the culture, structure and people aspects into practice as they make knowledge more transparent for every actor involved in the process (Eppler and Sukowski, 2000; Liebowitz and Megbolugbe, 2003; Corso et al, 2006).

Organizational culture in the context of knowledge management is concerned with promoting the right behavior so people are likely to have a positive attitude towards knowledge, such as motivation to generate, codify and share (Cortada and Woods, 2000). Apparently, organizational culture should foster knowledge transfer and encourage individuals to share knowledge both inter-personally and through systems. The management should constantly work on raising awareness of the employees and embedding the concept of knowledge in the organizational culture. Moreover, according to Lee and Choi (2003), culture is the most significant enabler of knowledge management. The authors of this study support this statement and believe that fostering knowledge oriented culture in an organization is a prerequisite for creating a knowledge intensive company. However, culture should not only influence the transfer and exchange of knowledge, but it should also foster the creation of knowledge, sometimes in less formal forms. In that sense, ‘communities of practice’, concept developed by Wenger and Snyder (2000) and ‘communities of creation’, as researched by Sawhney and Prandelli (2000) are interesting approaches that encourage innovation and creative thinking. The idea is to gather individuals on voluntary bases and discuss certain issues in an informal and spontaneous way, leading to knowledge creation. The individuals in organization are not obliged to participate in these communities, but are rather gathered together, driven by enthusiasm and motivation. According to Cortada and Woods (2000, p. 6) the common ways of shaping organizational behavior for promoting knowledge management in projects are through time, money, space, technology and management focus.
Organizational structure is an enabler for knowledge management and it makes difference if an organization is functional, matrix or project-based, as discussed previously and if it is centralized or decentralized. Traditional permanent forms of organizing contribute to development of trust in the work group which is an important facilitator for knowledge sharing, for example (Lindkvist, 2005). Thus, projectified work groups have to deal with the lack of traditional notions of organizing and find alternatives to facilitate coordination.

Finally, people and their ability and willingness to share knowledge represent a significant enabler. Lee and Choi (2003) suggested that individuals with T-skills are required, since they are able both to create knowledge and to combine it and share it with others. According to Johannessen et al. (1999, p. 128), T-shaped skills are related to the employees capabilities for both analysis and synthesis which allows them to see how their particular knowledge interacts with other branches of knowledge to function as a whole. However, after the empirical analysis and regression run, the results of their research revealed that T-shaped skills of the workers didn’t have significant impact on knowledge creation. In line with this, Zhao and Anand (2009) suggest that no matter how qualified and skilled individuals in an organization are, the knowledge management process heavily and mainly depends on collective, organizational issues, such as knowledge culture.

Regarding technical enablers, on the other hand, development of information technology systems plays a main role. It is especially important for codification strategy and therefore explicit knowledge transfer to have an appropriate information technology support. According to Cooper et al. (2002), companies have to realize that only by investing in knowledge they are able to gain benefits in the future.

The tools used as solutions for the knowledge management process will have direct relationship with the users’ intentions or needs and therefore they will be influenced by the knowledge strategy of codification and personalization implemented by the firm. A review of the literature points out several tools that may support knowledge management processes. Some tools emphasize face-to-face interactions whereas others rely heavily on virtual interactions, similarly some tools focus on tacit as opposed to explicit knowledge. The set of tools chosen by a firm or a project team will also be influenced by the group’s profile, for example geographically dispersed teams will require different tools than co-located teams, or team members with high technical skills may require more sophisticated tools. At the same time, as the set of tools is influenced by the profile of the team it also influences the efficiency of the process of knowledge creation, sharing and transferring. The table below summarizes the tools for knowledge management suggested by the literature.
<table>
<thead>
<tr>
<th>Authors</th>
<th>KM field</th>
<th>Tool</th>
<th>Meaning or Example</th>
<th>Type of knowledge</th>
<th>Specific project phase?</th>
<th>Collective vs. Individual Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eppler and Sukowski</td>
<td>KM in teams</td>
<td>Team matrix</td>
<td>Deduce the know-how needed from the goals of a project (gathered in a team stakeholder analysis) and then have the team position it in.</td>
<td>Explicit</td>
<td>Initiation phase</td>
<td>Collective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Expert map</td>
<td>Team members are asked to draw a chart in which they state 3 of their main areas of expertise and one area of improvement. Following, they list their contacts in the respective domain.</td>
<td>Explicit</td>
<td>Initiation phase</td>
<td>Individual</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pyramid principle</td>
<td>Structures the knowledge that a team has to acquire or develop into segments on several hierarchies.</td>
<td>Explicit</td>
<td>Throughout project life-cycle</td>
<td>Collective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Toulmin map</td>
<td>Structuring an argument into its main components, such as claim, grounds, warrant or rebuttal. In this way, the team’s knowledge development can be made explicit and individual differences can be made apparent.</td>
<td>Tacit</td>
<td>Throughout project life-cycle</td>
<td>Collective</td>
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<td></td>
<td></td>
<td>Visual protocols</td>
<td>A visual arrangement of a meeting’s main agenda points and the mapping of issues along these agenda points on a flip-chart or overhead projector.</td>
<td>Tacit</td>
<td>Throughout project life-cycle</td>
<td>Collective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flight plan</td>
<td>A pin-board on a central location that shows which team tasks are currently planned, under way, in a crisis situation (SOS), or about to finish. Attach news about their task, ask questions, or gain the team leader’s attention by posting their task in the SOS column.</td>
<td>Tacit</td>
<td>Implementation phase</td>
<td>Collective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Case study</td>
<td>Team members sit together to write up a concise account of what has happened in the team over the course of a project or task.</td>
<td>Explicit</td>
<td>Closure phase</td>
<td>Collective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lessons learned inventory</td>
<td>Team members are encouraged to contribute central insights into a common database or document repository.</td>
<td>Explicit</td>
<td>Closure phase</td>
<td>Collective</td>
</tr>
<tr>
<td>Szulanski and</td>
<td>Knowledge</td>
<td>Template</td>
<td>A working example</td>
<td>Explicit</td>
<td>Throughout</td>
<td>Individual</td>
</tr>
<tr>
<td>Authors</td>
<td>KM Environment</td>
<td>Tool Description</td>
<td>Timeframe</td>
<td>Level of Knowledge Sharing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>----------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
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<td></td>
<td></td>
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<tr>
<td>Zhao and Anand (2009, p. 962)</td>
<td>Classroom lecturing</td>
<td>Recipient joins the source team for learning; or source joins recipient at the</td>
<td>Explicit and Tacit</td>
<td>Collective</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>site of the receiving organization (recipients might acquire practices more</td>
<td>throughout project life-</td>
<td>Collective</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>quickly and effectively)</td>
<td>cycle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liebowitz and Megbolugbe (2003, p. 192)</td>
<td>Frequent get-togethers</td>
<td>knowledge fairs, brown bag meetings, seminars</td>
<td>Tacit</td>
<td>Collective</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Communities of practice/interest</td>
<td>Chat rooms, bulletin boards, online</td>
<td>Explicit and Tacit</td>
<td>Collective</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>communities on the intranet</td>
<td>throughout project life-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Corporate portal</td>
<td>Expertise locator system used as an entry into the organization’s Web site</td>
<td>Explicit</td>
<td>Individual</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Knowledge Repositories</td>
<td>Codifying knowledge into best practices/lessons learned database</td>
<td>Explicit</td>
<td>Collective</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Video streaming technologies</td>
<td>Capturing knowledge and decision making processes via expert systems</td>
<td>Tacit</td>
<td>Collective</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data and text mining techniques</td>
<td>Look for patterns and inductively create knowledge</td>
<td>Tacit</td>
<td>Collective</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intelligent agents</td>
<td>To actively build user profiles and push appropriate lessons learned and material</td>
<td>Explicit</td>
<td>Collective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corso et al. (2006, pp. 584 - 590)</td>
<td>Job rotation</td>
<td>Team members are assigned to different roles in the project in cycles</td>
<td>Explicit and tacit</td>
<td>Prior to Initiation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Corporate portals</td>
<td>Intranet websites</td>
<td>Explicit</td>
<td>Initiation phase</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Training</td>
<td>Courses provided by the firm</td>
<td>Explicit</td>
<td>Individual and/or collective</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Community</td>
<td>Moderated forums, where agents can meet, discuss, ask questions and exchange</td>
<td>Explicit and Tacit</td>
<td>Throughout project life-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>experiences</td>
<td>cycle</td>
<td></td>
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</table>

Table 5: KM Tools, adapted from Eppler and Sukowski (2000, pp. 337-339); Liebowitz and Megbolugbe, (2003, p. 192); Szulanski and Jensen (2004, pp. 347–363); Corso et al. (2006, pp. 584 - 590); Zhao and Anand (2009, p. 962);
2.6 Knowledge Management Processes

The enablers mentioned in the previous section are the building blocks for managing knowledge. However, their existence alone does not ensure that it is done successfully. They must be backed up by robust processes that transform the highly abstract organizational knowledge into re-usable knowledge. Knowledge management as a discipline is concerned with the processes of creating, acquiring, disseminating and interpreting new knowledge, integrating it with existing knowledge, and, ultimately, using it to achieve superior performance. However, knowledge tends to be sticky and according to Szulanski (1996, p 30) “...an organization equipped with effective routines to handle all aspects of a [knowledge] transfer is unlikely to consider that transfer sticky.” Therefore, it is crucial to define a proper knowledge management process within a company, to tap the vast know-how, best practices and knowledge that lie inside the organization and transform it in better business performance in terms of efficiency, organizational competence and customer satisfaction. However, there is a danger of following processes too strictly and neglecting creativity and innovation. Therefore, organizations should balance and try not to ‘over-process’ themselves, but to let the creativity and innovation develop inside the organization.

Academics have offered many knowledge management process models, with some similarities, but with numerous differences as well. Knowledge management processes are to be the central part of this research. Thus, the authors aim to analyze existing processes developed by different authors, to critically assess them and finally try to develop own process model based on others.

Nonaka’s (1991) seminal research on knowledge management popularized the concept of tacit vs. explicit knowledge, highly subjective and context–specific knowledge and that which is easily captured, formalized and transferred respectively. Nonaka suggests that these types of knowledge are not mutually exclusive, but rather complementary. The author discusses the process of transforming tacit knowledge into explicit knowledge which will later be internalized and put into practice, thus generating new tacit knowledge. This process is described as the four stage SECI model of socialization, externalization, combination and internalization. The first step comprises social interactions between individuals with the objective of knowledge transferring. In the next step, externalization implies the translation of tacit into explicit knowledge through organizational concepts, procedures and documents. The combination stage reassembles different parts of explicit knowledge generating a different outcome. Finally, in the internalization phase the explicit knowledge becomes part of the individuals’ contexts and thus becomes tacit knowledge again. Nonaka claims that this process happens not in a cycle, but rather in a spiral fashion as the translation of tacit into explicit knowledge eventually generates new tacit knowledge with innovative potential and the process continues.

Nonaka is considered to be a guru of knowledge management especially with regards to the concept of tacit vs. explicit knowledge and the spiral dynamic of the knowledge management process. However, his idea of translating tacit knowledge into explicit has been criticized by authors who do not believe that tacit knowledge can actually be captured and codified (Buckingham, 1997; Hildreth and Kimble, 2002).

The authors of this study accept Nonaka’s ideas regarding tacit and explicit knowledge and especially the spiral process. However, the researchers believe that Nonaka’s SECI model relies
too much on social interactions and physical proximity. Therefore, this model alone may not be fully applicable to today’s forms of organizing.

**Szulanski** (1996) distinguishes different steps in knowledge transfer phase; these are initiation, implementation, ramp-up and integration. Initiation phase is when the decision to transfer knowledge in organization is made. The following phase is implementation, when the exchange between the source and the receiver is taking place. Ramp-up phase begins after the recipient starts using the knowledge received. It is expected that receiver has some problems at the beginning, therefore this stage deals with his overcoming of these problems. Finally, integration stage is after the receiver achieves results by using transferred knowledge and the knowledge becomes part of the overall organizational knowledge.

The last two stages of transfer process overlap with the application stage of Alavi and Leidner’s (2001) process. As Szulanski suggests, ramp-up begins after the usage of the knowledge, therefore it can more fit into application stage, rather than transfer.

**Eppler and Sukowski** (2000) offer a holistic perspective of knowledge management, particularly within project team environment. They suggest five layers of knowledge management pyramid, namely platforms, norms, processes, tools and leadership.

![Figure 5: The Conceptual Framework for Team Knowledge Management (Eppler and Sukowski, 2000, p. 335)](image)

Eppler and Sukowski suggest following processes: audit/assessment, knowledge development, knowledge updates and review of lessons learned. Assessment is the first step, based on initial meetings of newly formed team in order to assess existing knowledge. The idea is to get to know each other and learn about others expertise and skills. Therefore, all the team members can receive necessary information on their future team members. Next, the authors propose developing process, which is somewhat the same as knowledge creation stage discussed by other authors; or the knowledge acquired from outside the organization. Following step is update of knowledge and finally the systematic review of lessons learned during the project work.
Alavi and Leidner (2001) approach the problem from a different perspective, taking into account four steps in the process, namely creation, storage/retrieval, transfer and application of knowledge.

Firstly, creation is consisted of four modes of knowledge creation, the SECI model by Takeuchi and Nonaka. Then, the authors define storage as an important activity due to the usual disregarding of knowledge. After it is created, knowledge might be lost or forgotten and therefore it is recommended that companies develop systems for storage. According to Alavi and Leidner (2001), it is organizational memory that needs to be developed, which is somewhat different from personal memory. Thirdly, transfer of knowledge is taking place at different levels, among individual employees, between an individual and a group, within groups, across groups, from groups to whole organization and can be formalized and informal. Finally, knowledge application is the usage of created knowledge in a particular context.

The authors suggest that there doesn’t have to be a particular sequence between the four modes, but after being created, knowledge can be applied immediately by an individual. They also address the issue of relations between individuals, groups and the whole organization.

Lee and Choi (2003) have developed a holistic model that doesn’t focus solely on knowledge management process, but starts from enablers that facilitate the process and concludes with organizational performance measures. As mentioned before, elaboration of enablers offered by Lee and Choi (2003) gives a useful insight into the prerequisites of the successful knowledge process. However, regarding knowledge process, it is to be noted that the authors mention only knowledge creation process, disregarding other phases, storage, transfer and application (Alavi and Leidner, 2001). Even if it can be argued that SECI contains transfer between individuals, groups and organization, it lacks other aspects of the overall knowledge process. Thus, this framework might benefit from inclusion of other parts of the process. In the creation processes, Lee and Choi have fully embraced the well-known SECI process of Takeuchi and Nonaka. The model further shows impacts of knowledge on organizational performance, with additional intermediate outcome.

![Figure 6: A Research Model (Lee and Choi, 2003, p. 191)](image)
2.7 Suggested Model of Knowledge Management

The model has been developed after the thorough analysis of models proposed by well-respected authors. In general, the authors of this study agree with what Kasvi et al. (2002) call the typical flow creation-storage-transfer-usage. However, the researchers think that these authors have missed a significant step that precedes creation, particularly in project environments, namely assessment.

The model is illustrated in this way in order to comprehensively present all the elements surrounding knowledge management in project environments. On the left hand side enablers are positioned, which are the input to the process. The potential phases of knowledge management represent the focal part of the model, together with sub-phases and in relation to the project life-cycle that happens simultaneously, but not necessarily in direct relation to above mentioned phases. The output of the process is presented in the form of business results, implying that once knowledge is managed appropriately, it results in better decision making, profit increase and other business benefits. Finally, the cloud illustrates innovation and creativity with the idea to bear in mind that there must be a balance between formalization and new idea generation and that knowledge is abstract and may not be completely structured. Further explanations are to be discussed in the following part.
Firstly, a knowledge management process may only be possible if it is supported by an organizational environment that promotes and encourages knowledge creation and management. This organizational environment is represented by the balance on the left-hand-side of the developed model. The authors of this study placed Lee and Choi’s enablers of structure, culture, people and IT as the building blocks for knowledge management processes in project environments. Organizations with flat hierarchies stimulate the involvement of employees in knowledge-intensive tasks, thus promoting an intensive flow of knowledge within the company. Moreover, organizations that encourage employees’ interactions and offer recognition accordingly may get results in terms of creativity and innovation. The skills of the people and the HR investments made by a company are vital for the effectiveness of a knowledge management process. Additionally, an organization should have the appropriate technological support to promote knowledge management. However, the authors of this research believe that the tools used by an organization to facilitate knowledge management also play an important role in this process and they may not necessarily be supported by IT. Thus, it is suggested to add Tools as another Enabler of Knowledge Management.

It is important to mention that the researchers of this study consider that Structure, Culture and People influence the effectiveness of knowledge management processes in a more intense way than Tools and IT as they are embedded in the organizational intangible competences and they shape people’s reactions. That is represented with the scale, showing more weight on Structure, Culture and People side.

The process flow developed by the authors of this study starts with an **Assessment** phase, as suggested by Eppler and Sukowski (2000). The authors of this research find this activity appropriate for project environments, since teams are usually newly created and before starting with project work, team members have to get to know each other and learn about others expertise and skills, therefore to assess existing knowledge in the project team. This step may also be useful in terms of understanding the gap between the existing and needed knowledge in order to plan possible knowledge development activities that may take place in the next phase of Creation.

Following, the **Creation** is the phase when knowledge is actually generated. The researchers agree with the authors who have adopted Nonaka’s SECI model, illustrating the transformation from tacit to explicit knowledge and vice versa. At this stage knowledge is created and shared between individuals, groups and organization. The idea that this may be done through either social interactions and/or formal organizational tools is supported as well.

The next step of **Storage** captures, codifies and formalizes previously created knowledge. This phase aims to establish an organizational memory that will be used in future opportunities. It
may include for example placing the knowledge in repository within the organization or creating organizational procedures. In general, storage phase includes all efforts towards registering for the future use.

The following phase is **Transfer** within the organization, between individuals or groups. The authors of this study have placed initiation and implementation stage of Szulanski’s process in transfer stage, while ramp-up and integration are part of use/reuse stage in the newly developed model, since it is more related to the exploitation of knowledge then to its transfer.

**Use/Reuse** is the representation of the ultimate objective of knowledge management efforts which is to apply relevant know-how, past experiences and individual knowledge to new situations. At this stage a project manager expects to minimize risks, increase accuracy, reduce costs and time by applying previous knowledge of best practices and past mistakes. It is expected that the use/re-use of knowledge will lead to favorable results on the project and organizational basis.

It is worthwhile mentioning that these five steps are presented as a sequence for practical reasons only. However, this is not a rigid sequence of events and steps may be inter-changeable or skipped according to the specific project and organizational context. For example, knowledge may be created and immediately re-used without being stored. However, there should be a consistent effort to capture relevant knowledge to avoid that it fades away.

The arrows surrounding the proposed KM process represent the project life-cycle. Although the model is intended for explaining knowledge management in project environments, the authors deliberately decided not to link the steps of the process to the project life-cycle phases for the same reason stated above. The researchers believe that linking the process steps with project phases would restrict the application of the model. The proposed KM process is not necessarily a rigid sequence; instead any process step may happen at any point of a project. For instance, a new knowledge may be created at the Closure phase of a project when the project team gets together to assess the project success.

The outcome of this model is to generate positive business results in terms of performance. Having the basic enablers may facilitate knowledge management which will increase the effectiveness of projects and therefore improve organizational performance. Having an appropriate knowledge management process may help an organization to increase innovation, reduce time-to-market, increase customer satisfaction, and most importantly, build inimitable competences.
Finally, it is important to emphasize that creativity and innovation must not be neglected as they are important part of the knowledge management process. Organizations should be careful not to over-formalize the knowledge management process focusing too much on routines. Creativity and innovation need to be nourished constantly in order to produce new knowledge and stimulate the continuous cycle.
CHAPTER 3
RESEARCH METHODOLOGY

Theoretical and practical methodologies are described within this chapter. The first one is related to the research philosophy definition, as well as research approach and strategy presentation. On the other hand, practical methodology part is providing reader with authors’ reasons for the choice of the subject, data collection methods, interviewee information and other relevant topics.

3.1 Theoretical Methodology

3.1.1 Research Philosophy

According to Saunders et al. (2007, p. 101), research philosophy is related to “the development of knowledge and the nature of that knowledge”. From a researcher’s point of view, it is important to define one’s philosophical stance before starting a research, since it will influence all the steps of a research to a high extent. Epistemology and ontology are two significant concepts within the research philosophy that contribute to the choice of research methodology and will be further discussed.

Epistemology is related to the nature of the truth and challenges if social science research can be performed in the same way as natural science research (Bryman and Bell, 2007). It may also be described as what knowledge is considered acceptable by a particular field of study (Saunders et al., 2007, p. 102). From this perspective, the epistemological position of a research is defined according to its principles, procedures and ethos with relations to the natural science. These may be classified into positivism, interpretivism and realism.

Positivism is an epistemological position usually taken by natural scientists, with the assumption that the world is the same for everybody and can be quantified objectively, leading to generalizations. The approach being used in positivist study is existing theory application and development of the hypotheses that are further to be tested. From this perspective, as the world is the same for everybody, the accepted hypotheses may be taken as laws and easily generalized to other settings. As Saunders et al. (2007, p. 103) argue, the positivist research is mainly value-free, meaning that the researcher is neither influencing, nor is being influenced by the research subject.

Interpretivism is diametrically opposite to positivism, with an assumption that social sciences cannot take the same stance as natural sciences, due to the unique element of each and every individual and organization (Bryman and Bell, 2007). Those that accept this position argue that the field of business and management is extremely complex and underpinned by a number of elements that add uncertainty to it (Saunders et al., 2007, p. 106). And thus the behavior of an individual cannot be predictable in a scientific manner. Interpretivism is embedded on the concepts that humans make sense of the reality around them and they are in a continuous process.
interpreting their surroundings. In that sense the researcher has to grab the subjective side of the human actions, since the main hypothesis is that every individual is different and accordingly perceives the world differently.

Realism can be seen as a mix of positivism and interpretivism and can best be described as “what the senses show us as reality is the truth” (Saunders et al., 2007, p. 104). To a certain extent, realists do approve positivist approach and natural science way of thinking. They accept the positivist scientific approach to data collection and analysis. At the same time they stress that rules cannot always be relevant, leaving space to interpretivist vision. Realism may manifest itself in two forms (Bryman and Bell, 2007, p. 18; Saunders et al., 2007, p. 105): Direct Realism which accepts that reality is accurately represented by what we experience through our eyes; and Critical Realism which argues that what we think as reality is not the things directly, but rather what our eyes see influenced by our sensations.

Ontology is a metaphysical branch related to “the nature of reality” (Saunders et al., 2007, p. 108). The ontological position of a researcher will translate his or her assumptions about the ways the world operates. The question here is whether reality is external to social actors or it is build up by their actions and perceptions (Bryman and Bell, 2007, p. 22). These two distinct views of reality are called respectively Objectivism and Subjectivism (also called Constructionism).

Objectivism is an ontological stance where “social entities exist in reality external to social actors” (Saunders et al., 2007, p.122). Thus, an initial assumption is that individual cannot influence the outer world.

Subjectivist position, on the other hand, argues that “social phenomena are created from the perceptions of consequent action of social actors” (Saunders et al., 2007, p. 122). This stance accepts the idea that other elements of the social world influence reality, such as the interaction among the social actors as well as their individual preferences and actions. Subjectivism implies that a phenomenon is not a distinct inert entity, but rather it may be highly ephemeral and it is influenced by a number of other aspects.

It is important to stress that none of the research philosophies can be defined as a better one. The appropriateness of the philosophy used in a research depends on the particular context of the research and its research question (Saunders et al., 2007).

For the purpose of this research authors have defined research question as: ‘Which processes and means should be used to facilitate knowledge management in project environments?’ Regarding epistemology, authors have chosen interpretivist perspective for more reasons. Firstly, the study will focus on project environment and having in mind the main characteristic of project as being “a unique endeavor” (PMI, 2004, p. 5), it is appropriate not to generalize. Additionally, Saunders et al. (2007) argue that usually in business environment it is more usual to take an interpretivist stance, due to the difficulty to generalize. From the ontological point of view, the research will take a subjective position, which is in line with interpretivist stance.
3.1.2 Research Approach

Research approach is concerned with the extent to which the researcher has a clear theoretical framework at the beginning of the study. In other words, it depends whether it is developed in the initial stage of the research or later during the process (Saunders et al., 2007, p. 117). In the former case, hypothesis regarding the topic will be created and tested during the research project. In the latter case, theory will derive from data collected. In that context, inductive and deductive approaches can be distinguished.

**Deductive approach** is related to theory development, followed by the test of the hypotheses. In this case, the researcher studies what is already known about a particular topic and then develops a set of hypotheses that will be tested and confirmed or rejected after the data collection phase. The result of this type of study is the revision of the theory around the topic of study. The challenge of the researcher who chooses this approach is to skillfully develop hypotheses and be able to design appropriate testing procedures (Bryman and Bell, 2007, p. 11). This approach has originated in natural sciences and is usually adopted by a researcher who is a positivist (Saunders et al., 2007).

**Inductive approach**, on the other hand, tends to develop theories after the data analysis (Saunders et al., 2007), so “theory would follow data” (Saunders et al., 2007, p. 118). In this context, conclusions are drawn after data collection and analysis (Bryman and Bell, 2007, p. 14). It might be argued that this stance offers a broader picture of the situation. According to Bryman and Bell (2007, p. 14), this approach is usually linked to studies that aim to investigate more subjective phenomena and in this case, a small sample may be appropriate. This approach is commonly associated with the epistemological position of Interpretivism and also to qualitative research.

Although these two clearly distinct approaches seem mutually exclusive, Bryman and Bell (2007, p. 15) argue that those approaches should be viewed as tendencies rather than a clear-cut. Therefore, researchers may also decide to adopt a **mixed approach**. Saunders et al. (2007, p. 119) suggest that a mixed approach is not only perfectly possible, but may also be advantageous. In this line, Alvesson and Sköldberg (2009, p. 4) state that many case studies use an **Abductive** approach. However, they also highlight that “Abduction neither formally nor informally is any simple mix of these nor can it be reduced to these; it adds new, specific elements.” According to these authors, issues such as time, data collection risks, personal preferences and preferences of those marking the research report may be taken into account, therefore a mixed approach may balance those aspects appropriately.

The research approach selected for this study is an Abductive approach for two reasons. Firstly, there is a wide body of knowledge around Knowledge Management and Project Management which was worthwhile reviewing and helped us to define a theoretical framework. This part of the research assumed deductive characteristics. On the other hand, Knowledge is a rather subjective topic that required an interpretivist position coupled with a qualitative strategy. Thus the researchers have chosen not to develop hypothesis, but to collect data and analyze in order to bridge the gap between theory and practice.
3.1.3 Research Strategy

The research strategy describes the overall perspective from which the research is conducted. In this sense, research is classified as quantitative or qualitative. This distinction implies the use of different methods of research in the business field (Bryman and Bell, 2007, p. 28). Research is usually classified as one of those two types of strategies according to the use or absence of quantification, respectively. However, the choice of research strategy does not stand alone. It is directly related to the epistemological orientation and ontological considerations of the study.

**Quantitative** research emphasizes quantification in data collection and analysis. This strategy is rooted in an objective view of social reality which considers the reality as being external and thus explicable by measurement. Therefore, quantitative research is used under positivism philosophy of research which entails a deductive approach to the relationship between theory and research with the objective to test theories.

**Qualitative** research focuses on the use of subjective aspects such as words to explain social reality which is product of individual’s creation rather than external. Researchers who use this approach understand that the reality is shaped by individuals, their experiences and interactions, therefore the means to answer research questions involve getting to know and interpreting those subjective aspects. This type of strategy is in line with interpretivism philosophy and emphasizes the generation of theories through an inductive approach.

Although these distinctions are made clear in the research theory, researchers may use a mixture of approaches in practice. According to Bryman and Bell (2007, p. 29) this distinction is not “hard-and-fast” as studies may combine different elements. When choosing between research strategies, it is crucial to ensure that the choices are appropriate to answer the research question and to ensure validity and reliability of the study.

<table>
<thead>
<tr>
<th>Principle orientation to the role of theory in relation to research</th>
<th>Quantitative</th>
<th>Qualitative</th>
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<tbody>
<tr>
<td>Deductive; testing of theory</td>
<td>Inductive, generation of theory</td>
<td></td>
</tr>
<tr>
<td>Epistemological orientation</td>
<td>Natural science model; in particular positivism</td>
<td></td>
</tr>
<tr>
<td>Interpretivism</td>
<td>Constructionism</td>
<td></td>
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<tr>
<td>Ontological orientation</td>
<td>Objectivism</td>
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Table 6: Fundamental Differences between Quantitative and Qualitative Research Strategies (Bryman and Bell, 2007, p. 28)

*In this specific study, the objective is to understand the processes and tools from knowledge management rather than validate a theory. Therefore, the qualitative strategy better fits to the purpose. In line with the qualitative approach, this research follows the main steps suggested by Bryman and Bell (2007, p. 406):*

1. General research question: a preliminary review of the literature was done and the research question was defined.
2. Selecting relevant site(s) and subject(s): the organization which is the subject of this research was contacted and accepted to participate of this research.

3. Collection of data: data is collected through semi-structured interviews.

4. Interpretation of data: organization and classification of data is done.

5. Conceptual and theoretical framework: similarities and disparities between the findings and literature will be discussed.

6. Writing up findings and conclusions: conclusions will be drawn.

The qualitative orientation chosen for this study reflects on its design. There are a number of means by which a qualitative research strategy may be taken into practice. According to Saunders et al. (2007), they consist of identifying sources from which data will be collected and selecting the type of data to be collected. When designing the research, it is important to take into account any possible constraints, such as time, budget, access to information or confidentiality issues from the source, for example. Saunders et al. (2003, p. 91) provide a list of possible research designs that may be used alone or combined according to the research:

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Ethnography</th>
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<tr>
<td>Action research</td>
<td>Survey</td>
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<tr>
<td>Case study *</td>
<td>Longitudinal study</td>
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<tr>
<td>Grounded theory</td>
<td>Archival research</td>
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</table>

Table 7: Research Designs (Saunders et al., 2003, p. 91)

Given that the objective of this research is to provide in-depth elucidation of knowledge management processes and tools in a specific organization, the case study was selected to support the design of the study. The suitability of case study will be discussed below.

The Case Study

In the research field, the term ‘case’ stands for specific situation, location or subject of study. In this sense, case studies may be used for analyzing a single organization, a single location, a person or an event. Bryman and Bell (2007, p. 63) state that case studies emphasize the intensive examination of a single setting. Similarly, Saunders et al. (2007, p. 183) claim that case studies are suitable for those who intend to “gain a rich understanding of the context of the research and the processes being enacted”.

Yin (in Bryman and Bell, 2007, p. 64) distinguishes three types of case studies. However, the authors claim that these types are not mutually exclusive and any case study may present a
combination of elements. Firstly, the critical case in which the research develops hypothesis and checks whether or not these hypothesis hold based on the study of a case. Secondly, the unique case which is commonly used in clinical studies and may not be applicable to business studies. Following, there is the revelatory study where the researcher observes an unknown phenomenon during the scientific investigation. The longitudinal type is concerned with changes over time. Whereas, the typical case study explores a case that serves as a particular example of an organization or situation.

While other types of research designs are concerned with generalization of the findings to a larger population, the case study is concerned with understanding a phenomenon in an unique setting in order to generate theory out of the findings. These will not necessarily be applicable to other settings.

The characteristics of case studies seem to correctly match to this research. In this study the authors look particularly to processes that are highly context-specific and seek to explain a subjective topic through intensive analysis of a specific department of single company, in a single location. Moreover, the authors analyze both the literature and a case that exemplifies the practices of the organization, and from there draw own model and provide conclusions. This will be done using a cross-sectional approach, meaning that the particular phenomenon will be studied in a short-period of time. The data collection method is explained below.

3.2 Practical Methodology

3.2.1 Choice of the Subject

There are more reasons that led to the choice of the subject.

Firstly, both researchers are very interested in the knowledge management field. Even though knowledge management issues were only mentioned in few modules during the master course, both researchers got extremely interested in the topic. Hence, the authors were motivated to start reading about knowledge management after being intrigued by the topic. This has led to an unanimous agreement to further research in this field and write master dissertation on knowledge management.

Secondly, due to the challenges and difficulties when managing knowledge in projects, the researchers of the study were determined to get the opportunity to research in project environment of Dell Computers. It is worthwhile mentioning that Dell Computers is a matrix organization, not project based, but the specific department that will be researched is working on projects. Additionally, another reason for focusing on projects is the nature of this master course, with projects being a focal point of the study, so authors found appropriate to research in a project environment.

Thirdly, one of the researchers of this study was working for Dell Computers and experienced difficulties when needed to find information in company’s database or to locate a person who could be able and/or willing to share the information and knowledge. Specifically, this is the reason for the choice to focus on knowledge management processes and tools.
3.2.2 Data Collection Methods

The choice of case study does not imply a specific method for data collection. Saunders et al. (2007, p. 139) suggests that a number of data collection techniques are likely to be associated with case studies and those may also be combined in order to meet the research needs. Examples of data collection methods may include: questionnaires, observations, documentary analysis and interviews. Moreover, the type of method is also influenced by the nature of the research question and the practicalities, such as availability of literature on the field, access to the organization and budget. In this sense, the type of data that best matches these criteria has to be taken into account. Commonly, data can be classified into two categories: primary data, which is collected by the researchers directly in the source or the research subject; and secondary data, which is data previously published by others, such as documents, newspapers, academic journals and books.

After considering the types of data and the characteristics of this research, the authors considered that primary data collected through semi-structured interviews would best fit the purposes. Interviews are defined as discussions between two or more people (Saunders et al. 2007, p. 310). In the case of semi-structured interviews they are non-standardized. Although the interviewer may have a loose set of themes and/or questions to be covered, these may be omitted or further developed according to the interview context. Additionally, other questions may rise during the conversation. The interview is recorded for future transcription and analysis and notes may be taken.

Semi-structured interviews suit authors’ objectives in this research as they allow the researchers to gain an understanding of individual’s experiences and the underlying meaning they construct from their context (Seidman, 1998). This will be crucial when investigating the processes involving tacit and explicit knowledge management in project environments. Furthermore, this approach may reveal topics that the researchers were not aware of when planning the interviews, but which may be vital answering the research question.

The semi-structure interviews have the benefit to be similar to a common conversation and thus it allows the interviewee to feel more comfortable with sharing information. On the other hand, the previous assumptions together with the lack of experience of the interviewers may influence in a negative way the development of the interview guide or the flow of the conversation. These aspects where taken into account in the research planning.

3.2.3 Research Sample and Participants

As mentioned previously in this study, in a qualitative approach there is no aim for generalizing the findings but rather for generating meaningful knowledge. Therefore, qualitative research differentiates itself from the quantitative type of research where often a probabilistic sample is used to ensure with statistical relevance of findings and eventually to facilitate generalizations. According to Bryman and Bell (2007, p. 198), probability sampling requires more preparation, time and budget. Qualitative sampling is non-probabilistic and may take the forms of:
• **Quota sampling**: The interviewer selects a sample that he considers to be representative of portions of people in different categories, such as gender, age, region or ethnicity for example (Bryman and Bell, 2007, p. 201).

• **Convenience sampling**: The choice of sample is mainly influenced by its accessibility. Regarding this type of sampling, it may be argued that the sample selected may not be representative and thus the research instrument should be piloted in order to minimize possible issues. This type of sampling is pointed out to be particularly common in business and management field (Bryman and Bell, 2007, p. 197).

• **Snowball sampling**: The researcher makes contact with an initial group of potential respondents and uses these to access other people relevant to the study. This is considered to be a type of convenience sampling and its commonly associated with qualitative study (Bryman and Bell 2007, p. 200).

The sampling of this research can be classified as **convenience sampling**. The reason behind it is that Dell Computers was first selected to be studied due the possibility of gaining permission to perform the study in the organization and accessing data because one of the researchers has worked for this company before and therefore the organization was likely to accept it. Additionally, this research also presents elements of **snowball sampling** in the sense that the researchers first reached out to a former peer of one of the researchers who provided the contacts of the senior manager of the department in which the research was to be undertaken. After getting the agreement from the legal department, the senior manager then accepted to be interviewed and also suggested the project managers who would be available to further interviews as well as could best provide a rich insight for the research purpose.

### 3.2.4 Dell Computers Overview

Dell is a multinational technology company which develops, manufactures, sells, and supports personal computers and other computer-related products. It was founded in 1984 by Michael Dell on the concept that by selling computer systems directly to customers, the company could better understand and meet their needs. This revolutionary strategy in the PC industry was called ‘Direct Model’. Today, Dell has manufacturing plants, business units and offices in several locations in the world and employs more than 88,000 people worldwide (Dell Computers website).

The global organizational structure of Dell is primarily organized by customer segment, namely consumers, small and medium businesses, large enterprises and public sector. A secondary segmentation is based on geographical regions of Americas; Europe, Middle East and Africa (EMEA); and Asia, Pacific and Japan (APJ). As per Arvidsson (2009, p. 98) definition, Dell may be classified as a matrix organization where “line functions and projects live side-by-side in mutual co-dependence”. Arvidsson calls it a projectified matrix organization with permanent hierarchical structures based on functions, geographical markets and customer segments along side with temporary organizations manifested in projects. He points out that this type of structure
may be characteristic of manufacturing firms such as Dell Computers that uses projects to create internal change and development.

The present research was done in the EMEA headquarters of Dell located in England with particular focus on the work of the project management office (PMO) of the Business Operations department dedicated to large enterprises and public sector in the EMEA region. In terms of reporting, the PMO is part of the global PMO group. However, they are doted-lined to the Business Operations functional structure as they are responsible for managing large scale process improvement projects that support business operations activities, such as processing of sales orders, interface management of orders between sales and manufacturing, and customer services.

The PMO team consists of one program manager with fifteen direct reports, including project managers and support roles. Although the program manager is located in England, the team members are strategically located across the company sites in England, Ireland, Switzerland, Slovakia and Morocco. These people are responsible for leading and supporting large scale global projects as well as developing and leading medium and small scale local initiatives.

### 3.2.5 Selection of the Participants

As previously mentioned the sampling of this research is classified as convenience sampling from the perspective of the selection of the firm that serves as the case study and, at the same time, snowball sampling in terms of the selection of the interviewees. The first interviewee contacted was the senior manager of this PMO team who provided an overview of the team members, projects managed by them and knowledge management processes and tools. Following this contact, the senior manager appointed four project managers to be interviewed. The description below shows that the group of interviewees represents different backgrounds in terms of culture, project management experience and role in terms of knowledge management in their team.

**Interview 1 - Senior Manager** of Business Operations PMO for Relationship customer segment in EMEA region: She has been working for the company for over eleven years in a variety of roles in project management and program management in a wide range of business activities such as Sales, IT services, IT solutions, Customer Services and Order Processing. The senior manager is based in Bracknell, England, UK.

**Interview 2 - Project Manager A**: This interviewee has started in the firm as Process Engineer for Business Operations four years ago. He has particular experience in projects involving process optimization and standardization, especially in order processing, order entry and has been working in the present team for one and a half years. He is based in Casablanca, Morocco.

**Interview 3 - Project Manager B**: This interviewee has a robust background in IT. He joined Dell in 2007 moving into a business area. In the company he has had one year experience as a project manager in mergers and acquisitions and has been working in the present team for six months. He is currently based in Ireland.
Interview 4 - Project Manager C: This interviewee has eleven years experience in the firm. His experience involves roles in sales support, people management, partner relationship management and project management in a variety of business functions at Dell. He has joined the present team in 2007. He is based in Bracknell, England, UK.

Interview 5 - Project Manager D: This interviewee has been working for the company for six years and in this specific team for six months. Besides managing projects in the PMO team, this interviewee is also the focal point for knowledge management in the team being responsible for the set-up and maintenance of the team’s share point. She is based in Bratislava, Slovakia.

3.2.6 Interview

3.2.6.1 Interview Guide

Literature around semi-structured interviews suggest that this is a non-standardized type of interview (Bryman and Bell, 2007, p. 474; Saunders et al., 2007, p. 312) where the interviewer develops prior to the conversation a list of themes or questions that will later guide the interview in order to ensure that the interviewer covers all the necessary topics. However, according to Saunders et al. (2007, p. 312), questions may be omitted as well as new questions may arise during the conversation. Similarly, Bryman and Bell (2007, p. 474) highlight that semi-structured interview guides also offer the freedom to the interviewer to change the order of questions according to the natural flow of the conversation.

In the case of this research, a first interview guide (appendix 1) was developed for the interview with the senior manager of the department under research. This guide aimed at understanding in detail the projects run by the PMO team as well as detailed information on the process used by the team to manage knowledge and the tools used by this team. Questions were developed based on the new theoretical framework developed on page 27 of this paper. This enabled the identification of questions that potentially could generate the data required to answer the research question. The questions were mostly open-ended and potentially led to elaborated answers. The interview guide started with general questions regarding the interviewee’s background and career path in order to create a friendly start for the conversation and at the same time to understand her background. The specific questions were divided into sections, namely:

- Company’s overall culture
- Team’s culture
- Company’s overall structure
- Team’s structure
- Assessment
- Creation
- Storage
- Transfer
- Use/Re-use
- Business results
- Creativity & Innovation
- General questions
The supervisor of this research reviewed the questions prior to the interviews in order to confirm the suitability of the questions to the objectives of this research as well as to suggest any possible changes in terms of wording or reasoning that could increase the chances of collecting valuable data.

A second interview guide (appendix 2) to be used with the project managers was developed using two distinct approaches. First, a similar approach to the first interview guide was taken where potential questions were created based on the theoretical framework described previously. Second, those questions were adapted or omitted and new questions were created based on the analysis of the interview with the senior manager. The mixture of these two approaches ensured that the data relevant to research question were collected, at the same time as the researchers could further investigate topics raised by the first interview. The second guide also consisted in open-ended questions. Although it contained questions around similar topics, in order to facilitate the flow of the interview the interviewers decided not to divide into the same sections as the first interview. Instead, it was divided into: ‘Interviewee’s Background’; ‘KM processes and tools’ which contained the questions regarding their knowledge management processes and tools; and ‘Perceptions’ which consisted of questions regarding their perception on the efficiency of those processes and tools.

3.2.6.2 Conduction of the Interviews

Interviews are usually done in a face-to-face fashion (Bryman and Bell, 2007, p. 486; Saunders et al. 2007, p. 313). That may be true in the cases when the interviewer and the interviewees are based in the same geographical region. Where great geographical distances exist between both parties of the empirical research it is accepted that, due to time and money constraints, the interview is done through phone or internet. Although internet is accepted, phone interviews are considered to be the best media for semi-structured interviews after face-to-face because it is a simultaneous mean of communication that allow the researcher to capture the spontaneous reactions of the interviewee as well as to rephrase ambiguous questions if necessary and ask clarifying questions. For this research a mixed approach to conducting the interviews was adopted.

The interview with the senior manager of the department under research was conducted face-to-face in the company’s headquarters in England. That was possible due to a coincidence with one of the researcher’s travel schedule who, due to personal reasons, would be in a city close to the company’s headquarters in England in the same period of empirical data collection. The researchers scheduled a one hour meeting which is a reasonable length and has been enough time to cover in details all necessary topics (Saunders et al., 2007, p. 316). The interview took place in one of the company’s meeting rooms which ensured a quite environment. Besides that, the interview was recorded upon the interviewee acceptance. It is obvious in Findings and Discussion part that great attention was paid to Interviewee 1, her quotes were cited in most cases, which is due to the importance and relevance of her answers. It is the result of senior manager’s personal involvement in the processes and experience, not authors’ random choice.
After the first interview the senior manager has talked to four of her direct reports in order to inform that they have been appointed to answer this interview as well as to explain the objective. When contacted by the researchers, all four project managers promptly accepted to schedule a one hour meeting. These interviews were made through phone as they are based in multiple locations across EMEA region such as Ireland, Morocco and Slovakia. The conversations were also recorded upon the interviewees’ agreement.

With the objective to create an appropriate environment where the interviewee felt comfortable to answer the questions, all interviews started with introduction from interviewers’ side, when the background was presented, details of the master course explained and details on the thesis and objectives of the interview provided. Following, the specific questions were asked following the guide, omitting questions and asking details about topics as necessary, according to suggestion of Bryman and Bell (2007) and Saunders et al. (2007). Finally, the interviewers explained the next steps of the research and opened for interviewee’s questions.

Recording the interviews is a simple yet important aspect of empirical data collection (Bryman and Bell, 2007, p. 489). The fact that all interviews were recorded was extremely useful in the case given the amount of data collected in five one hour interviews. Recording the interviews also allowed authors to transcribe them in order to facilitate compilation of interviews answers for later analysis. The transcriptions were made immediately after the interviews which seemed appropriate as the authors could write down some personal comments to a particular interview. As emphasized by Bryman and Bell (2007) and Saunders et al. (2007) transcribing the interviews was very time consuming and required a great effort.

Table below summarizes the interviews conducted for this study.

<table>
<thead>
<tr>
<th>Interview #</th>
<th>Position</th>
<th>Years in company</th>
<th>Years in this team</th>
<th>Interview Date</th>
<th>Interview Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview 1</td>
<td>Senior Manager</td>
<td>11 years</td>
<td>1.5 years</td>
<td>09th Nov 2009</td>
<td>51 minutes</td>
</tr>
<tr>
<td>Interview 2 -</td>
<td>Project Manager A</td>
<td>4 years</td>
<td>1.5 years</td>
<td>19th Nov 2009</td>
<td>48 minutes</td>
</tr>
<tr>
<td>Project Manager B</td>
<td>Project Manager</td>
<td>2 years</td>
<td>6 months</td>
<td>20th Nov 2009</td>
<td>41 minutes</td>
</tr>
<tr>
<td>Interview 4 -</td>
<td>Project Manager C</td>
<td>11 years</td>
<td>2 years</td>
<td>23rd Nov 2009</td>
<td>40 minutes</td>
</tr>
<tr>
<td>Project Manager D</td>
<td>Project Manager</td>
<td>6 years</td>
<td>6 months</td>
<td>25th Nov 2009</td>
<td>38 minutes</td>
</tr>
</tbody>
</table>

Table 8: Interviews Conducted in the Study
3.2.7 Data Analysis

Data analysis is the phase when the researchers have the opportunity to integrate the theoretical background with the data collected, and thus this is the most crucial phase of the study. The primary criteria to define the approach chosen for analyzing data is the type of data collected, namely quantitative or qualitative. Saunders et al. (2007, p. 472) point out that quantitative data analysis tends to be focused on numbers and as such it depends on statistical significance whereas in qualitative data analysis the objective is to understand the meaning of the data collected. Besides that, the timing of data analysis may also differ depending on the nature of data collected (Bryman and Bell, 2007, p. 582). Analysis of quantitative data is expected to be done after all data is collected. On the other hand, qualitative data collection allows a constant interplay between collection of data and analysis. In this case some data is collected and a preliminary analysis is done which may have implications and shape the next steps of data collection. The data analysis process of the present study follows the characteristics of qualitative data analysis mentioned above. The interview with the senior manager of the department under research was done, it was transcribed and a preliminary analysis of the transcription was performed. These preliminary findings have influenced the development of the interview guide for the following interviews.

Saunders et al. (2007, p. 478) state that qualitative data analysis may assume diverse forms. It may be highly formalized and supported by rigid procedures or it may rely more on the researcher’s interpretation. Moreover, the approach may be classified as deductive where theory or a predefined framework generates categories to analyze the data, or inductive where categories for analysis emerge from the data collected. This study does not strictly follow neither deductive nor inductive approach. It rather adopts a mixed approach in which categories for analyzing data derived from the predetermined theoretical framework (p. 27) as well as the researchers accepted the fact that new categories could emerge from the data.

The process of analyzing data has the objective to assist the researchers to (i) comprehend and manage the large amount of non-standardized data collected; (ii) identify relationships between different transcripts and/or categories; (iii) draw and verify conclusions. In order to do that, Saunders et al. (2007, p. 478) suggest that a common procedure to all types of qualitative data may be used which includes the following steps (Saunders et al. 2007, pp. 478-484):

- **Categorization**: data is classified into meaningful categories which may have derived from a theoretical framework or from the data itself. These categories must be meaningful with respect to both the data and to each other.
- **Unitizing data**: this step implies a selective process where data is reduced and rearranged into a more manageable form by attaching relevant parts of transcripts to the appropriate category.
- **Recognizing relationships among categories**: at this step a more thorough reflection on the rearranged data is done with the objective to search for patterns and relationships in the categories.
• **Drawing conclusions**: at this point patterns and relationships between categories are explained and general conclusions are drawn bringing the particular data collected into the lights of a wider academic field.

The common procedures to data analysis mentioned above may also be complemented by a number of other specific data analysis methods such as analytic induction, grounded theory, template analysis, discourse analysis, narrative analysis, and data display and analysis (Bryman and Bell, 2007, pp. 578-599; Saunders *et al.*, 2007, pp. 492-507). For this study, the researchers chose to adopt all steps of the common procedures of qualitative data analysis coupled with some elements of Data Display and Analysis. This approach was believed to be simple and yet effective enough to guide the researchers to answer the research question. It is also important to mention that the level of complexity of this approach appropriately matches the researchers’ limited experience and time constraints. The specific steps taken by us are summarized below:

![Figure 8: Qualitative Data Analysis Steps in the Study](image)

3.2.8 Quality Criteria

All too often qualitative research has been criticized for its subjective nature (Bryman and Bell, 2007, p. 423). Some quantitative researchers suggest that qualitative studies are influenced too much by the researcher’s own interpretations of facts and in this way he chooses what is significant or important from his own perspective. Besides that, the fact that qualitative studies
follow a rather non-standardized methodology makes it extremely difficult to replicate. Finally, qualitative research is also contested in terms of its potential for generalization from that particular group of individuals, firms or locality from a certain study to other settings. In order to minimize those criticisms Bryman and Bell (2007, p. 410) suggest a number of elements that describe quality criteria.

In quantitative studies, quality is defined in terms of reliability and validity which imply measurement of data to ensure that rigid methods of data collection were adopted. Validity refers to whether the researcher is measuring what he intended to measure, whereas reliability is related whether the same result would occur in case the measurement is repeated. Conversely, in qualitative research measurement is not a major concern as this type of research aims to understand meanings and obverse behavior. Guba and Lincoln (1994, in Bryman and Bell, 2007, p. 411) propose two criteria for assessing quality in qualitative studies, namely Trustworthiness and Authenticity. These include (from Guba and Lincoln,1994, in Bryman and Bell, 2007, p. 411).

**Credibility**

It is concerned with the debate between several possible accounts of an aspect of social reality and the one presented by the researcher. In order to have credibility a study must present an account of social reality that is acceptable by others and to do so it must (i) be conducted according to good methodological practices and (ii) be assessed by those who were studied. This is also called respondent validation (Bryman and Bell, 2007, p. 411).

In order to comply with the Credibility criteria this study will be validated by all five interviewees prior to submission of the final copy. It is important to note that this step is not intended to serve other personal or organizational interests apart from ensuring that the researchers accounted for what the respondents meant during the interviews.

**Transferability**

It accounts for the possibility of transferring the findings of a study to another context or the same context in another time. This is particularly considered to be an empirical issue in qualitative research due to its contextual uniqueness. Although Guba and Lincoln (1994, in Bryman and Bell, 2007, p. 413) consider transferring findings in qualitative studies very hard, they suggest that researchers should provide the readers with maximum detail of the context in order to describe all relevant aspects of this setting in case of future transferring.

The researchers believe that several of the findings of this study may be transferred to other settings. This is true especially for more general results such as the two levels in which knowledge may be managed in a project environment, for example. The same may not apply to more specific findings that can be highly context specific and thus may not be appropriate for other organizations. Nevertheless, it is important to mention that the partial lack of transferability does not impact the potential contribution of this study to a broader understanding of knowledge management particularly in project management settings (Blumer, 1954 in Bryman and Bell, 2007, p. 408):
**Dependability**

It means to ensure that a rationale of all steps of the research process is kept for future consultation if necessary. This includes but is not limited to problem formulation, selection of context and participants, interview guide and transcripts, data analysis approach, etc. At the end of the research, this information should become available for a peer who would act as an auditor to confirm that proper procedures have been followed. Although proposing this method of ensuring trustworthiness, Guba and Lincoln (1994, in Bryman and Bell, 2007, p. 414) admit that it is extremely time-consuming for the auditors and thus this approach has not been widely adopted.

The present study was not subjected to peer auditing, however it was constantly reviewed by the supervisor who ensured that the satisfactory procedures were undertaken throughout the study. This is believed to be a suitable approach to increase dependability in a small-scaled research project such as this study.

**Confirmability**

Guba and Lincoln (1994, in Bryman and Bell, 2007, p. 414) suggest that complete objectivity is virtually impossible in business studies. On the other hand, they also argue that it is necessary that a researcher acts in good faith avoiding personal interests or preferences to influence the study results.

The authors of this study state that the present research has been done respecting all appropriate ethical aspects and all elements of this research have been cross-checked by both researchers and the supervisor. In this way the researchers hope that any possible inclinations of any of the people involved could be minimized.

**3.2.9 Ethical Considerations**

Research ethics refers to the appropriateness of the researchers’ choices and behavior in relation to those who are affected by the research, in this case these may be the organization, the respondents, the academic institutions involved and any potential readers of this study. According to Saunders *et al.* (2007, p. 178) researchers must ensure that the study follows good methodological practices as well as it is morally correct from the perspective of those people involved in it. A number of authors list ethical principles that must be respected by researchers or ethical issues that should be avoided (Bryman and Bell, 2007, p. 132; Saunders *et al.*, 2007, p. 181). Although their perspective over ethics seems to differ, the aspects touched upon somewhat overlap. They include the following (from Bryman and Bell 2007, p. 132; Saunders *et al.*, 2007, p. 181):

- **Participants Consent**: this includes the clear acceptance of the participants (organization and/or people) to be involved in the research.
- **Privacy**: this consists of maintaining the confidentiality of data and the privacy of possible and actual participants respecting any requests for confidentiality and/or anonymity whenever requested.
• *Deception:* this consists of avoiding any type of manipulation of data or people.
• *Harm:* the researcher should avoid causing any type of embarrassment or harm to those involved in the study.

It is important to mention that the senior manager of the department under research has provided a formal acceptance to participate in this study on behalf of the organization. This acceptance has been done through e-mail with the acknowledgment of the legal department of Dell Computers. Before the agreement, the researchers provided the senior manager with details of the research design such as research question, methodology and type of data required to answer the research question. The company agreed in disclosing information as long as no details on specific projects were disclosed due to its strategic content. Moreover the company presented no restrictions in having its name used in the study. The participants of the study have also consented participating in the study. The interviews were recorded after their acceptance and confidentiality was ensured as their names were not disclosed. Therefore, the interviewers created an environment of trust which facilitated gathering relevant data.

It is also worthwhile mentioning that data collected throughout this study has been treated with great care and has been presented as it is, in other words there has been no intentional manipulation in order to serve personal or organizational interests.
CHAPTER 4
FINDINGS AND DISCUSSION

This chapter is dedicated to empirical findings of the study. It is divided in two parts, namely, findings and discussion. The text in both parts is structured according to the categories from the suggested model in order to be more clear for the reader. After the thorough discussion, the revised model of knowledge management is presented in this part, as the final result of the research.

4.1 Findings

4.1.1 Enablers

People

‘People’ is a significant enabler that can contribute to knowledge management processes if the organizational setting is suitable and encouraging towards employees’ knowledge management activities (Lee and Choi, 2003). During the empirical part of the research and regarding this enabling factor, authors’ have focused on different aspects of ‘people’ enabler. Firstly, the desired competences for knowledge management activities of employees are to be analyzed. Secondly, the behavior of the senior manager in the team and her actions towards knowledge management goals are to be discussed. Finally, the desired skills of the employees will be analyzed, as compared to Lee and Choi’s (2003) idea of T-skill employees.

When being asked about main competences for knowledge management among the employees, interviewees were clear that good communication skills are required in both directions, meaning that it is not enough for an employee just to be skilled to transfer the information properly, but to be able to receive it in a right way as well. On the other hand, self-confidence was stressed by another interviewee, in a sense that it is important to feel confident enough about the information that is being transferred and not to feel threatened. This issue is discussed by Ghoshal and Gratton (2002) who additionally relate managers’ self-confidence to the culture within the company.

"In order to be willing to share knowledge, they got to have self-confidence first of all. They have to be confident in their work and not fell threatened... because you know there is some kinds of people that feel threatened by sharing information, they like to retain information in order for them to feel...ah...information is power! There must be a very healthy relationship among team in order for everybody to share openly their knowledge. So I think that’s all. Yes, I think that exists! (in PMO team)” (Interviewee 2).

Moreover, the above stated quote indicates that needed competences are present within the team. Most importantly, as the respondent said, it is “healthy relationship” that is needed in an organization to provide knowledge sharing activities. This issue is partially related to culture and structure as well and will be discussed in the following parts of the text. In relation to this,
respondents were clear that their colleagues are supportive and collaborative among themselves and thus contribute to knowledge management activities with this type of behavior.

Considering senior manager in the team, it is clear that her role is crucial and that her personal preferences and beliefs significantly shape what team does in terms of knowledge management. The findings suggest that the initiative for knowledge management actions is coming in a high extent from senior manager’s initiative. It is mainly caused by the type of work that the team is performing, but by her awareness and previous experience as well. The typical initiatives from her side are shadowing and mentoring activities in the team, allowing less experienced individuals to learn under the supervision of more senior people. In this way, she promotes a sharing environment where people are ready to support one another and less experienced people are not directly exposed to responsibilities, but rather offered an opportunity to learn. The role and commitment of a leader to knowledge management are stressed by Eppler and Sukowski (2000). This seems to perfectly fit with the profile of the senior manager in the team.

“I like to promote what is a sort of a buddy or a mentoring system within the group and this again is actually very specific for knowledge sharing so I would have a junior team members go work with or go talk to other more senior members in the team to make sure that they have an opportunity to talk and discuss and share and maintain that relationship. So for example I’ve got my most junior member of the staff right now...she really needed to be supported. The role that she was going to be performing didn’t really lead itself to that, so I’ve done I’ve actually given her one of the more senior members of the team as nearly a team lead, so it’s not quite shadowing but they talk every couple of days. She shares what she does with him, and actually less with me, and it’s a much more informal way of providing feedback. With me she finds it quite difficult, she wants it to be perfect, but with him she can be much more open about where she is struggling or what didn’t work and then he might offer her suggestions of how she might try things differently.” (Interviewee 1)

Regarding T-skill individuals, Lee and Choi (2003) claimed in their paper that highly qualified individuals contribute to knowledge management activities. However, the results of their empirical research revealed that T-shaped skills didn’t have high impact on the knowledge management: “Without an environment in which T-shaped skills flourish, people with T-shaped skills will not attempt to create new knowledge” (Lee and Choi, 2003, p. 213). This is in line with the findings of Zhao and Anand (2009). If trying to apply this to the research sample, one can conclude that the profile of the respondents is showing their high qualifications and skills, which can have either positive or neutral effect on knowledge management. However, what is even more important is the environment which allows these individuals to build knowledge management and it is certainly present within the team.

Structure

As stated in other parts of the text, Dell Computers is a matrix organization, with project teams assigned for particular tasks. The group that is subject of the research is a project team with all its characteristics. According to Arvidsson (2009), it is a typical projectified matrix organization having both hierarchical structures based on functions, geographical markets and customer segments and temporary organizations for project purposes. Dell seems to have a flat
organizational structure that is complemented by the open-doors culture resulting in a positive feeling from the respondents who feel free to approach people from all hierarchical levels of the company to seek knowledge.

At a PMO team level, there also appears to be a flat hierarchy with a senior manager and fifteen direct reports. With regards to knowledge management, one team member has been assigned as focal point of knowledge management initiatives among the team, being responsible for setting up and maintaining a team share point where the team members’ profiles, contact numbers, holiday information, templates for project management as well as other documents related to the project work are stored. This seems to be a very good strategy for knowledge management, because it ensures that someone is responsible for these activities. The Storage step of the process is generally problematic in project environments, where the time constraints pressurize for quick closure and do not allow time for knowledge management. However, the intention of a senior manager is not to make this person responsible for knowledge management solely, but to try to engage all the members in knowledge management activities.

“I don’t want to make her the single point of it because I want everyone to be able to do it, so the share drive that she has set up is, if you like, a wider team share drive. And it is something that we can open up to other team members in the organisation”. (Interviewee 1)

In the research of Lee and Choi (2003), variables of enabler ‘structure’ are centralization and formalization. The results of their empirical study have shown that there is no relationship between formalization and knowledge processes, even if their hypothesis claimed negative relationship. However, the authors state that further analysis on the relationship is needed. In the case of the researched team, centralization doesn’t seem to be the case. On the other hand, respondents confirmed that the procedures are not highly formalized. As defined by Lee and Choi (2003), “formalization refers to the degree to which decisions and working relationships are governed by formal rules, standard policies, and procedures” (p. 192).

"There’s no tracking on this. When you start a programme, no one will to say you that didn’t pick the right template." (Interviewee 3)

"If I’m driving my own project, definitely I have autonomy to chose whatever I think will work best in terms of communication and organisation.” (Interviewee 2)

Therefore, having less centralized and not formalized ambiance in the project team may have no effect or possibly lead to the positive impact of the enabler ‘structure’ in knowledge management processes.

Culture

Culture consists on the organizational wide values and ways of doing business together with the way that people understand and use it inside the department. According to Lee and Choi (2003) culture as a knowledge management enabler is extremely powerful. In case of this PMO department all respondents were positive in agreeing that Dell has openness with regards to the professional relationship among employees. To this end the culture seems to make people feel comfortable to seek for information in any department, location or hierarchical level. All project
managers seem to value this aspect of Dell's culture very much due to the fact that they see the constant need to seek for knowledge related to either project management techniques among their team or related to the operational projects that they work on from the functional teams. This notion may be appropriately illustrated by the following quote:

“I think that Dell’s culture in the sense that it promotes open communication, and you don’t really feel a strong hierarchy or not being able to speak to someone because they have a certain position...So, in that sense, it feels accessible to ask questions, to speak to anyone or set-up a call with anyone to get the information you need.” (Interviewee 2)

On the other hand, there also seems to be agreement between the respondents that Dell's open-doors culture is more concerned with the softer aspects such as creating a willingness to share, it does not provide practical means for that to happen. When asked about the alignment of knowledge management with the firm’s overall strategy and to which extent the strategy supports KM efforts, one of the interviewees clearly indicated that it supports in a softer way, but provides limited practical means for it to happen. This obstacle has to be solved by individual initiatives.

"I think they have started to do that much more seriously over the last few years. I think when I started 11 years ago, it was a lot more ‘blazé’, there was a lot less reference to it. I would say that maybe over the last 5 or 6 years they have really started to understand that there is a critical knowledge factor in the people that they have and started managing it better. But again, much less of a format provided and much more of an individual preferences" (Interviewee 1)

In order to bridge this gap, the organizational culture in this particular case is complemented by the team's culture, especially created by the leader of the team who sees KM as a significant part of her team's work. An example of that was the creation of a team’s share point by the senior manager which is dedicated to general knowledge management among the PMO team members. Although this resource is available inside the company it is not commonly used by many departments which indicates that it was an effort promoted by the senior manager concerned with providing extra means of managing knowledge within her team.

These findings suggest a close relationship among the enablers listed in this research. Firstly, the organizational culture works as a basic requirement to create awareness around the importance of knowledge management, setting the guidelines and shaping people’s willingness to participate in this process. Secondly, the company’s structure in terms of hierarchical layers also plays an important role making it easier or harder for people to approach one another and engage with different hierarchical levels in a knowledge sharing process. Thirdly, personal profiles influence knowledge management processes in the sense that personal awareness of its importance will be encouraged and, as part of an organizational community, a person gets involved in the firm’s culture and develops a set of skills that facilitate knowledge management processes. Finally, the knowledge management processes must be consistently supported by appropriate levels of IT infrastructure and tools. In other words, knowledge management in project environments should be understood in a holistic manner, taking into account that all aspects of the organization are linked and reinforce one another.
Throughout the interviews the respondents mentioned a number of means used by them to create, store and transfer knowledge. These tools mixed different features in terms of media, type of knowledge, level of formalization and focus on the different steps of knowledge management processes of creation, storage and sharing. According to Hansen et al. (1999) the choice of tools is influenced by organizational factors such as culture as well as managerial strategies. As mentioned in the previous section dedicated to People, the senior manager of the department studied is especially aware of the benefits of knowledge management for this project team and thus she stimulates the use of several different tools that aim to cover different types of knowledge and apply to diverse settings. Details on the culture were discussed in this section. The diagram below shows the tools listed by the respondents in relation to the knowledge strategy, whether personalization or codification, and the type of knowledge, namely explicit or tacit (Boh, 2007; Nonaka, 1991).

![Figure 9: Knowledge Management Strategies vs. Knowledge Types vs. Means for Knowledge Transfer; developed from Koskinen et al. (2003, p. 286), applied to Dell Computers](image)

The company’s intranet is a basic source of highly codified and explicit knowledge. This is a corporate tool that is offered to all members of the company. Particularly inside this project team, knowledge is transformed from tacit into explicit knowledge, it is codified and presented in a formal written form through a number of different templates, the team’s share point and the program-specific share point. The templates are used especially for activities directly related to project management methodology, such as basic phases of projects, set-up of roles and responsibilities, and presentations for stakeholder management purposes. These templates are kept in the team’s share point which is a web-based storage similar to a website where the team stores the profiles of the PMO team members, contact details, holiday schedule, travel schedule as well as guidelines on project management techniques with the relevant templates. The team’s share point is a new initiative created by the team’s senior manager in order to set-up a memory of the department’s programs, thus in the near future they also expect to include lessons learned in this share point. Additionally a separate share point is set-up by the project manager in charge.
of each program. These separate share points are organized into four phases matching with the program life-cycle of each project. All program team members have access to this location where they store documents related to the problem investigation, roles and responsibilities of members, deliverables, schedule, progress status, executive presentations, and lessons learned.

Informal written information is created and shared through electronic messages and corporate messenger, in this case Microsoft Communicator. These tools allow the communication of both explicit and tacit knowledge. Although knowledge must be codified in written form to be transmitted through these means, they also accept some level of personalization as they allow a more spontaneous conversation and they allow a flow of information back and forth.

Managing tacit knowledge seems to be the biggest challenge in knowledge management (Ekstedt et al., 1999). Being aware that projects create a great amount of new knowledge and that the time constraints may reduce the project managers’ focus on it, the senior manager of the PMO team promotes a list of means to capture and share tacit knowledge using different levels of personalization strategy. Tele-conference meetings are used between the PMO team members as well as within the project teams. In this case a group of people joins the same phone call and have the opportunity to discuss subjects that require the whole team’s attention. Additionally, tele-conferencing may be complemented with live-meeting which is a web-based tool that allows a group of people to see one team member’s desktop. This tool is widely used for explaining or teaching complex topics such as reports or applications. Mentoring and Shadowing are a resource that this team uses in order to transfer tacit knowledge. In these cases a junior member of the team will be supported by a more senior one who has the responsibility to develop the person’s technical and soft skills. For example, the senior member may provide tips on how to manage highly influential stakeholders in a complex project. Besides that, 1:1 sessions and ad-hoc phone calls are also a widely used practice between the PMO team members as well as with other departments. As per the senior manager’s statement below, she sees those tools as important means for managing knowledge and she personally takes care of integration of knowledge in those situations.

“...often I would step in and say ‘pay attention!’ this is really important, this issue is not exactly the same as the one you are facing, but there is a real comparison. So, ‘name of the person’ is going to tell you what he has done, how he overcome it.” (Interviewee 1)

Finally, face-to-face meetings are also used to create trust among the teams and share knowledge. It is important to complement other means of knowledge transfer with face-to-face interactions, because it is accepted as the most effective way to create relationships based on trust that will facilitate the transfer of knowledge. However, all the interviewees have suggested that this tool is not frequently used in this team and they feel that they could benefit from having more of it. One of the project managers provided evidence that one of these meetings was scheduled for some time soon after the interview:

“...next week we will be having an offsite meeting there. That would involve both, the kind of knowledge sharing and transferring, but also offsite in the evening for a couple of nights with informality, like have a meal and go to Christmas market and that kind of thing...so, it helps to build relationships with the members of the team." (Interviewee 4)
According to Lee and Choi (2003), information technology plays a crucial role among technical enablers for knowledge management. Generally, particular importance is given to IT when transferring explicit knowledge.

Most of the respondents agreed that Dell offers the right level of IT infrastructure to support knowledge management. It is expected to be so, due to the nature of the work that company is doing. However, depending on the respondents’ background, answers differed to some extent. For example, an interviewee who is an IT expert said that there is no need for much IT for knowledge management purposes anyway.

When questioned about this topic the respondents usually mentioned some of the tools such as video-conferencing, live-meeting and the share points as examples of IT. This is again as expected, due to the fact that the team is dispersed across EMEA region. Indeed, even more importance is given to the information technology in this kind of team setting. Moreover, team members don’t have the opportunity to meet face-to-face as much as needed and they are trying to overcome this by having live conferences and therefore exchange tacit knowledge with the help of IT. Sometimes obstacles can be overcome by using robust IT to support communication, but it is obvious that it cannot always replace direct communication.

“Well, the technology that we have in Dell makes things a little bit easier. So, for the quick questions that I need to ask, really there is not much difference from a face-to-face interaction! I think there also cases when you do need face-to-face interaction, in that case, it tends to be when you are looking for a very big objective or a big chunk of a project. In that case you would schedule travel, either for you to go or people come to you, so you build trust, brainstorm together and have 100% focus on what you are doing.” (Interviewee 4)

Regarding academic literature, Gupta et al. (2009) agree that co-location benefits knowledge management. In order to build an effective team with people in different locations, special attention needs to be paid to virtual networks and communication through information technology. Additionally, Hambley et al. (2007) distinguish two types of mediums, namely synchronous and asynchronous. With synchronous mediums people can interrelate in real time (chat, video-conferences), while asynchronous tools allow communication in different times (e-mails, repositories). According to the authors, the use of both types of means is recommended because different purposes are being served. Moreover, they are compatible and therefore appropriate to use in parallel. This seems to be the case in Dell computers according to the findings.
4.1.2 Processes

When being asked about the knowledge management processes, interviewees provided researchers with different answers, focusing on diverse aspects of their work and different knowledge types. The findings led the authors to realize that knowledge management processes can be seen from different perspectives. The first stance is ‘within’ project, which basically comprises project phases, project management methodologies and templates. The other standpoint is ‘across projects’, encompassing activities that happen simultaneously to projects, regarding human side, ways to manage projects, best practices exchange among the managers. Therefore, the findings on Processes will be divided in two parts, with separate analysis of the results.

It is important to mention that this finding does not contradict the authors previous decision not to link the knowledge management process phases illustrated by the theoretical model to the project life-cycle. This is supported by the fact that the step of the process to manage knowledge may be observed at any of the phases of project life-cycle cycle adopted by Dell. The project life-cycle phases were mentioned during the interviews as a mean to assist the conduction of the empirical research, because it was easier for the interviewees to comment according to their usual mind-set, in terms of project-life cycle, than to switch to KM phases from the model. However, during interviewees description of knowledge management activities within project life-cycle, all the process phases from the model were recognized (assessment-creation-storage-transfer-use/reuse) and will be discussed in the discussion part of this chapter.

Since the ‘across projects’ perspective emerged during the empirical research, authors will deliberately place analysis of this part in the end, after the analysis on previously established categories of the model.

‘Within projects’

The project phases listed by the senior manager are pre-envisioning, planning, building or development and deployment. Furthermore, all the phases were explained during the interview with senior manager and the analysis of these phases specially related to knowledge management issues will follow.

Firstly, pre-envisioning stage, which is usually named initiation in the literature (PMI, 2004), is mainly related to the communication between program managers and their team members, learning and training through workshops and big picture building in general. The aim of this stage is to understand the problem and get the team members ready for the following phases.

"In pre-envisioning stage, it could be, it’s largely an evaluation stage, in that, I would expect the individual programme managers to spend 70% of their time in communication, so, talking to the people who currently are within those roles. I would have the programme manager go sit with them and work out what is going on, they may have a workshop to try to understand better what the challenges are, I would get them to review current reports and understand the data and I would get them to start building a picture of what the other regions do. So, it’s really a time of big picture building, of really understanding what’s going on”. (Interviewee 1)
According to the respondent’s answer, it seems that this stage is mainly based on personal interaction, without any insight into the knowledge repository, which might make the work more complicated and the stage might last longer due to the time spent on finding the right person to talk to.

Secondly, planning phase starts with clear picture on what is to be done in the project and deep understanding of the following project by all the team members.

“In the planning stage then they can start referencing material from other programme, which is very typical, so the standard templates, the standard planning structure, up until then it’s totally dependent on how much knowledge there is about the subject, what they are able to find out”. (Interviewee 1)

The documents used in this stage are Excel sheets, as an alternative to Microsoft Project, Roles and Responsibilities, process maps, project plans. Additionally, project teams are defined in this stage and the profile assessment is done through relationships. Obviously this works in practice, but does not seem to be a good long-term approach because people may leave the company and others might join, therefore networking might not be able to provide all the information on the individuals. The idea was triggered by the following comment:

“(The people assessment) is very much based on relationship. What I do in parallel or before, once I know the name, is find out...often again through relationships...what that person has worked on before, who they’ve worked with, what level of knowledge. I would also talk to the manager (of that person), so I would spend a good couple of hours talking to the manager...maybe over a period of a week or so...about what their skills sets are, what their weaknesses are, what their strengths are. Because I can be fairly flexible, as long as I have a base level, I can be fairly flexible about how I assign the work and what happens within it. I need to understand if this person needs absolute clarity of directions or whether they can deal with ambiguity. I need to understand whether they are very good on coming back with things absolutely on time or whether I’m going to need to chase permanently. It’s a lot about finding out about the individual. I will make sure that their manager ties that into their performance plan what there are doing.” (Interviewee 1)

This appears to be a drawback and the company should maybe have a tool that is used for the assessment of employee’s skills, rather than relying on personal, subjective recommendations solely. These personal judgments might mislead, due to the bias.

The next phase is building or development, mainly related to testing, or ‘soft launch’, as they name it at Dell. There are some initiatives in the company coming from the senior management interviewed to conduct much faster pilot in order to save time and proceed further with decision whether to go for it or stop it.

“At that point we would be into training materials, into really the preparation and readiness, so depending on whether it is IT focused or it is business focused, there is a wide gap between the amount of material we would have had. In training and readiness we would pretty much use training tools only, while in operational changes we would use visual process maps and flows and in IT programmes we would go through the planning and build stages, with a significantly higher volume of documentation, sharing and reviews, for set it up.” (Interviewee 1)
Finally, deployment phase is the final step of the project when the real-life application is done.

“What you’ve tested now you deploy in live environment. You have to make sure that you change what needs to be changed. You would have deployment plan.” (Interviewee 3)

There is massive documentation involved in this phase and the communication with legal department in order to make sure that legal requirements are completely met. As a part of deployment, stabilization activities are done as well, as stated in the following quote:

“We have stabilization in every programme we do. It would normally be max 4 weeks, depending on what we are looking at, could be less, but for an IT programme it takes typically 4 weeks. If it’s a very operational piece, we would have scorecards and measuring key indicators such as quality and velocity and we would have a structure to show what we expect on a daily basis, week by week, as they improve followed by a handover as the operations team takes ownership we take that step back.” (Interviewee 1)

During the project life cycle, project share point is used as a repository for the documentation and the information related to the particular project. It is different than team share point, that is kind of a broader database containing information on all the projects within a team. The owner of the project or program share point is project or program manager, who is responsible for its set up and maintenance.

"In programme share point you would share any tracking, project tracking, any updates, weekly updates, monthly reviews, any background documents to programme and projects, any justification to benefits and costs etc." (Interviewee 3)

Within the project/program share point, all the team members are allowed to access the repository and all of them can upload the documents and edit them. Only in some specific situations, with confidential information, access can be restricted, but it is usually not the case with project/program share points.

"You give access to people working on the project. We have interest in updating our participation." (Interviewee 5)

4.1.3 Business Results

All members of PMO seem to understand very clearly the potential business results that could be brought by managing knowledge appropriately. The interviewees’ stand-point seems to be in line with academics who consider the potential impact of knowledge in future decisions (Damm and Schindler, 2002, p. 37). They appreciate that their work involves knowledge-intensive tasks and thus proper mechanisms to manage it are beneficial to their daily activities (Pretorius and Steyn, 2005; Koskinen, 2004). The following section extracted from Interview 2 illustrates well their perspective:

“It’s useful when...if you are working on a similar type of project that someone has already worked on, then it’s useful to go back and look in the different ways that they’ve conducted their work and the way they’ve structured the project’s risks...” (Interviewee 2)
Additionally the interviewees have emphasized that knowledge management processes are particularly important for project management. They understand that (i) although each project deals with different business aspects, the fact that they follow the similar phases creates the opportunity for generating learnings that apply to other projects (Pretorius and Steyn, 2005). Like that they expect to minimize uncertainties; (ii) projects generate a large amount of new knowledge in a short period of time and it is crucial to capture and share that knowledge before the project is phased out, thus avoiding ‘organizational-amnesia’ (Schindler and Eppler, 2003; Ekstedt et al., 1999); (iii) they believe that having their team in multi-locations is one more reason why they should put extra effort on knowledge management (Corso et al., 2006). The following section summarizes the practical results to project management through KM mentioned by the interviewees:

“It could help you to be more aware of them and more careful of them [risks and issues from the past] in order not to make the same mistakes again. Actually, in this project that I’ve just finished, the last year we had the same type of project, to move some activity from some European countries to Casablanca and some other medium-cost locations and we’ve learned a lot the first time. And now when we applied it this year, we had lessons learned from the previous project we did last year and we were able to leverage on those learnings and basically not making the same mistakes. In project management, you know, sometimes you don’t control everything, different things come up and the more you are careful with it and the more you are aware of the risks, the easier it becomes.” (Interviewee 2)

In overall terms, the findings suggest that the current initiatives towards knowledge management in the PMO team seem to be achieving their objectives in terms of promoting creation, storage, sharing and re-use of knowledge. Although the team does not use an objective mechanism to assess the their performance in terms of knowledge management processes, most of the interviewees pointed out that those activities are well developed in their team and furthermore that their team is considered an example of good knowledge management in the organization. However, when asked specifically about the results created by the new team’s share point which seems to be the main knowledge management tool at the moment, the interviewee’s indicated that this tool had been implemented three months before and they could still not clearly see its’ impact. It also implies that when introducing new tools, results cannot be seen immediately. Instead it should be allowed more time for results to be noticed. There seems to be clear results of knowledge management processes within this team, particularly to their project management practices.

Finally, it is also important to mention that the final objective of managing knowledge in projects appropriately is to generate positive results for the overall organization. This objective seems to be ensured both by the project managers and the leader of the team who sets challenging goals in terms of business improvements.

“We set them very, very big challenging goals, because I want them to get out of the mindset of thinking small, so I would say to them as a 50% improvement minimum. It’s not 5% or 10%. It’s 50% improvement, or you need to double it. So it stops team thinking about tiny little improvements, and they have to stand back and say: How on earth am I going to improve that double? In most instances I absolutely expect those results. We look ourselves as a transformational change team, so if I think that a change that my team is proposing could have
been done by junior operational person, we need to go back, that’s not the level that we are expecting.” (Interviewee 1)

4.1.4 Innovation and Creativity

In order not to become ‘over-processed’ and too formalized in knowledge management and thus impede the creation of new knowledge, it is important to let creativity and innovation exist in an organization. According to Inkpen (2008, p. 452) “experimentation is also necessary to build a continuous learning process.” Due to the above stated reasons, innovation and creativity are important category of the knowledge management model developed by the authors of this study.

The respondents have confirmed that innovation is significant in their work. Moreover, senior manager of the PMO has realized that creativity plays a crucial role and the following quote demonstrates it:

“It is massively important for us, which is why I don’t attempt to constraint them too much, I want structure and consistency, but I don’t want it without creativity. So, I encourage them in that planning phase to be as uninhabited as they can and then what we do ideally and I have very diverse team, some of them come from finance, some from sales, procurement. I prefer them to have an enormous idea that we need to bring down rather than a tiny idea that isn’t going to go anywhere.” (Interviewee 1)

In relation to employees’ creativity, when being asked if the knowledge is the row material in her team, senior manager replied:

“Good question... I think some of my team relies on their knowledge, to be creative. They need that as a foundation. Other members of my team actually don’t need the knowledge to be very creative, they can find the knowledge to determine whether it supports them. Some people think negatively, some think ‘this could work if I do this’. So, I would say it differs with different people.” (Interviewee 1)

The quote shows that the level of creativity being involved in the work depends to a high extent on individuals, their originality and ability to generate ideas. Anyhow, both more creative and those who depend on previous knowledge when generating ideas are inputting their creativity in the daily activities, which is very positive.

When performing everyday activities, members of the PMO team do not have to stick tightly to the procedures and templates, but are allowed to choose their own way of doing things and performing activities, as long as they are able to fulfill the tasks properly and please main stakeholders. The quotes that follow illustrate this idea from different perspectives, team member’s and senior manager’s.

"If I’m driving my own project, definitely I have autonomy to chose whatever I think will work best in terms of communication and organisation.” (Interviewee 2)

“So, we will offer different templates for different things, but there is no restrain from the programme manager to go and to create something new. That’s fine! If they are managing their
stakeholders well, if they are setting expectations appropriately, if they are able to communicate well and seek feedback on that, I don’t mind if their format is different because they may have just found something better than what we have already. So we are not restrictive with it. I like certain bases to be touched, but I’m not restrictive in terms of go and find a new better way of doing things.” (Interviewee 1)

To conclude, creativity and innovation seem to be present in the PMO team researched which is very positive and allows not only existing knowledge to be managed, but new knowledge to be created as well.

4.1.5 Category Emerged from Data – KM Process Across Projects

As mentioned before, when asked about processes used for managing knowledge in this PMO team interviewees suggested that there is the need to manage knowledge not only inside the boundaries of the projects and programs, but also across projects or independently to any specific project being ran. The details provided by the interviewees suggested that one single process does not comprehend both situations, thus a separate category was created to cover processes aimed at managing knowledge across projects. This finding was motivated by comments such as the following:

“The things that we do in parallel would be sharing lessons learned from other programmes, we would have programme updates from other teams, so every programme manager may be working something different, but they would regularly be getting some level of input and updates from other programmes... so that everybody gets an understanding where the other programmes are. We all talk about what a general programme approach is, goal, about issues we are facing, resolution of those issues.”(Interviewee 1)

Comments like that suggest that the type of knowledge shared across projects is more of tacit nature. In other words, knowledge that may be applicable to all projects, such as leadership skills, influencing skills, how to manage stakeholders, or how to manage project teams, for example. It may also include best practices sharing with regards to project management techniques, such as reports or templates. The soft characteristics of this type of knowledge lead us to think that its management would rely more on informal interactions where trust and a strong relationship among people play an important role (Gupta et al., 2009).

“For example, in Casablanca, there are 4 people in the team, 3 of them car share, so they come in and out, for about an hour journey either way. So what happens is that they are all working in different fields, but the actually have very intimate knowledge on what the others are working on, because they talk about the problems in the car, they talk about them when they are having a coffee, what things went really well, and what were the successes. So, we are really getting that sharing, that sharing is also about who they are working with, one of they would say, I am working with such and such, or I have a problem and the other will say... oh you need to go talk to him.” (Interviewee 1)

Although tacit knowledge commonly requires informal interactions, the findings also suggest that the senior manager of the team managed to have a balance between informal and formal interactions as a way to overcome the geographical distance which impedes frequent informal
interactions in this team. According to the interviewees, exchange of information would also in face-to-face meetings, team teleconference meetings and 1:1 sessions. Additionally, the senior manager also places great emphasis on Shadowing and Mentoring where junior members of the team have the opportunity to establish a closer relationship with more senior members and thus receive informal feedback. Some of the initiatives of knowledge management across projects are summarized in the following quote:

“In our one-on-ones, I have them every couple of weeks with every team member, when we have a discussion, I will say go talk to them (another programme manager) about it, go listen to how they worked that through, let them tell you about what didn’t work, and how it did work. So, we are constantly connecting them. In parallel, I make sure that the team members on site aren’t all working on the same programme, so I actually force them to go to other places and work with other people, because, it is comforting to work with people who work the same thing in the same place, and yes they would share lots of information. They would naturally get that input and share it because they sit next to each other, but driving cross country and language relationships means they get both, local and remote knowledge sharing.” (Interviewee 1)

With recent organizational changes, less experienced team members entered this PMO team which has created the need for this team to put more effort into transforming tacit knowledge into explicit. As a mean to do that a team’s share point was implemented around three months before the interviews were conducted. This is a web-based site which stores a profile of each of the PMO team members with their background and relevant experiences, their contact details, holiday schedule, travel schedule. Besides that, it also stores templates, documents, links to project related websites like Business Process Improvement (BPI), online trainings related to project management as well as success and failure stories from projects. This share point is under the responsibility of one of the project manager (Interviewee 5), however the senior manager made clear that sharing knowledge among the PMO team is every team member’s responsibility and she, personally, puts great effort to facilitate it. The team’s share point is available not only for the project team members but also to other members of the firm indicating the awareness of this PMO to the importance of sharing knowledge in a wider context and thus contribute not only for the learning among the team, but also to other people.

The creation of this new category seems to be appropriately in line with the research findings and allowed the researchers to cover a set of processes which are supported by specific tools that wouldn’t otherwise be taken under consideration in the previous category of ‘Processes Within Projects’. It has also shown that different types of knowledge are approached in different ways and require appropriate tools that mix informal and formal interactions and various levels of formalization. These topics will be further analyzed in the next section of Discussion.

The table below summarizes empirical findings.

<table>
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<tr>
<th>People</th>
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<td>Desired people competences to facilitate knowledge management: self-confident about their work, don't feel threatened, trust, communication skills, being articulated.</td>
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<tr>
<td>Less emphasis on technical skills and more on general skills.</td>
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<tr>
<td>The team members see their colleagues as supportive and collaborative which makes knowledge management easier.</td>
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</table>
Senior manager has broad project management experience and sees knowledge management as crucial given the type of work of the PMO team.

• Dell has hierarchical structures based on functions, geographical markets and customer segments and temporary organizations for project purposes (projectified matrix organization).
• Respondents feel that it is easy to approach people from all hierarchical levels.
• PMO team has one senior manager and 15 direct reports at similar hierarchical level.
• One team member is assigned as focal point of knowledge management initiatives among the team.

Respondents emphasized the 'open-doors' culture of the company.
• Project managers consider that 'open-doors' organizational culture has a positive impact in their project management activities, such as investigation of problems, for example.
• Respondents indicated that culture is more concerned with creating a willingness to share knowledge and it does not provide practical means for that to happen.
• Organizational culture is complemented by the team's culture especially created by the leader of the team who sees KM as a significant part of her team's work.
• Respondents indicated the need for culture to be assisted by structure, people skills and tools/IT in order to facilitate knowledge management.

Set of tools used for knowledge management: face-to-face meetings, teleconference meetings, live meetings, 1:1 sessions, shadowing, mentoring, templates, team share point, program share point, ad hoc phone calls, e-mails, Corporate Messenger, intranet.
• Choice of tools is influenced by organizational factors such as culture, managerial strategies, size of company, geographical dispersion and IT infrastructure.

Respondents agreed that Dell offers the right level of IT infrastructure to support knowledge management.
• The importance of IT in knowledge management initiatives is related to the team's geographical dispersion and the size of the company.

Some interviewees stressed knowledge management within project teams whereas others emphasized on knowledge management among the PMO team related to different projects.
• Two stances of KM in project environments were identified: 'within projects' and 'across projects'
• 'Within projects' knowledge management is focused on project management methodologies (kick-off meetings, end-of-phase reviews, lessons learned, etc).
• 'Across projects' category seems to be more focused on soft aspects (how to manage particularly complex projects, how to solve problems, which approach to take to influence and manage stakeholders, who to talk to, etc).
• There is an ownership structure set for knowledge management initiatives: Project managers are responsible for KM within projects; One focal-point is assigned for KM among the project managers; the senior manager support all aspects of KM.

<table>
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<tr>
<th>Business Results</th>
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<tr>
<td>• They appreciate that their work involves knowledge-intensive tasks and proper mechanisms to manage it is needed.</td>
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<td>• Interviewees expectations are: to generate learnings that apply to other projects; to minimize uncertainties; capture and share that knowledge before the project is phased out thus avoiding organizational-amnesia; to minimize the impacts of geographical dispersion of the team members.</td>
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<tr>
<td>• The interviewees pointed out that those activities are well developed in their team and furthermore that their team is considered an example of good knowledge management in the organization.</td>
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<td>• Results for the overall organization is ensured by senior manager who sets very challenging goals in terms of business improvements.</td>
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<table>
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<tr>
<th>Innovation and Creativity</th>
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<tr>
<td>• The respondents have confirmed that innovation is significant in their work.</td>
</tr>
<tr>
<td>• The senior manager stated her attention to avoid over-formalization and to maintain project managers' autonomy.</td>
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</table>

Table 9: Summary of the Empirical Findings

4.2 Discussion

All elements of previously proposed model for knowledge management in project environments have been identified in Dell’s Business Operations PMO case study. However, the analysis of their practices showed us that the KM process is more complex than what the previous model could demonstrate. The similarities and discrepancies will be discussed below.

The empirical research allowed us to identify all enabling elements that were previously mentioned in the theoretical framework. At the same time as all enablers were correctly verified, no new enablers were found during the case study. This leads the authors to believe that the adoption of Lee and Choi’s (2003) enablers together with the addition of Tools correctly cover the enabling factors of knowledge management in project environments.

The findings indicate that Culture is the building block for knowledge management and thus the most influential enabler. This finding is in line with Lee and Choi’s (2003) perception on the importance of a proper organizational culture that values people’s knowledge and encourages creation, storage and sharing. In the case study it could be seen that the organizational culture is translated through the company’s understanding of the importance of knowledge for the business. The case study illustrated that the organizational culture plays an important role in shaping the company’s Structure in terms of openness among the hierarchical levels as well as shaping its people’s skills creating a willingness to share knowledge which is crucial for the success knowledge management processes. Moreover, Cortada and Woods’ (2000, p. 6)
suggestion of ways to influence knowledge management in projects (money, time, technology and management focus) seem to be confirmed in this case study. Although money incentives were not verified in the case study, it was mentioned that the workers engagement and commitment with knowledge management initiatives have an impact on their performance reviews which eventually will reflect on their bonuses. On the other hand, time was often mentioned by the project managers as a constraint to proper knowledge management. The same happened with space where the geographical dispersion of the team was a factor that influenced their way of working. Dell’s technological infrastructure was also verified and will be discussed later in this section. Finally, the management focus on knowledge management was considered to be a significant aspect in terms of creating a strong culture towards knowledge management.

The interviews have revealed an interesting aspect of Culture as a KM enabler. The interviewees have mentioned repeatedly the word “sharing” in the sense that the Dell’s culture encourages knowledge sharing. It led researchers to believe that their culture emphasizes too much “knowledge sharing” and not so much the other steps of the KM processes of assessment, creation, storage and usage. This perception was confirmed later when a less developed set of tools for knowledge assessment was noticed. These findings suggest that Culture should comprehend all elements of knowledge and also indicate that the culture alone is not enough for establishing a proper knowledge management process. It should be accompanied by Structure, People, Tools and IT.

It is worthwhile mentioning that the empirical research has revealed that Structure as an enabler can be analyzed from two standpoints, organizational structure as a whole and the specific project team structure with regards to knowledge management. This important aspect of Structure was neglected by the literature reviewed previously (Lee and Choi, 2003; Lindkvist, 2005) which considered the organizational structure only, namely functional, matrix or project-based organizations. From the organizational structure perspective, Dell is considered a projectified matrix organization (Arvidsson, 2009, p. 98). According to the case study, it can be said that flat hierarchical layers together with a culture of free communication between people from diverse levels create an environment where knowledge management is likely to flourish. With regards to the structure for knowledge management processes within the project team, the findings indicate that responsibilities and expectations should be well defined, because projects require a very fast paced environment that may obstruct the efforts for codifying and sharing knowledge (Ekstedt et al., 1999). As per Dell’s example, having someone assigned for KM is a good alternative in project environments to ensure that it is done appropriately. On the other hand, having one single focal point may result in less involvement from the other project managers which may represent a risk to knowledge management success as it needs engagement of all members of a team. This risk could be overcome by the leadership of the team manager who, in the case of Dell, has assigned this focal point with the responsibility of facilitating knowledge management to a certain extent whereas she maintained clear expectations regarding the effort of the other project managers. The authors of this study consider correct that management of more general knowledge inside a PMO is assigned to someone in the team. However, researchers believe it is necessary to highlight that it should be done in a way to always involve all projects managers, thus promoting the mechanisms for them to manage knowledge appropriately within the project teams. This may be done through transforming knowledge management into a clear deliverable expected from project managers, being also part of their list of roles & responsibilities.
Complementing Culture and Structure as knowledge management enablers, People are considered to be the heart of creating knowledge in organizations (Lee and Choi, 2003, p. 188). From this standpoint the authors agree that this enabler deserves special attention. Several authors have mentioned T-shaped skills as enablers for knowledge management. According to the literature (Johannessen et al., 1999; Lee and Choi, 2003), T-shaped skills should result in a high capability for analyzing and synthesizing knowledge, and most importantly, establishing relationships between different branches of knowledge. The researchers of the study fully agree with this idea. However, the description provided by literature of the set skills that facilitate knowledge management seemed to be fairly general and does not clearly indicate the required skills. Based on the case study it can be said that there is less emphasis on technical skills and more on general skills, such as self-confidence, trust, communication skills, organization skills and relationship skills. These skills seem to be helpful in order to “think and act on knowledge” (Johannessen et al., 1999, p. 127). Moreover, these skills seem to be part of T-shaped skills that may be very valuable in project environments because they equip people to expand their competences across functional branch areas and this is very important in project management.

Regarding Tools, the empirical research has confirmed its expected importance according to the theoretical framework adopted. However, the case study also revealed that tools don’t necessarily mean documentation, but also includes communication initiatives that are systematically used and become a best practice of the project team. The literature presents an exhaustive list of means that may be used to address knowledge managements needs (Eppler and Sukowski, 2000; Szulanski and Jensen, 2004; Zhao and Anand, 2009; Liebowitz and Megbolugbe, 2003; Corso et al., 2006). Authors of this field also highlight that the choice of tools should match with the specific context, the aims and needs of the organization. Some of the tools recommended by literature were recognized in the empirical research such as case study and lessons learned inventory offered at Dell through end-of-project reviews and the share points (Eppler and Sukowski, 2000), templates are also widely used by the project teams (Szulanski and Jensen, 2004), frequent get-togethers through tele-conference meetings, face-to-face meetings and 1:1 sessions (Liebowitz and Megbolugbe, 2003), corporate portal and knowledge repositories (Corso et al., 2006; Liebowitz and Megbolugbe, 2003) and trainings through online courses for example (Zhao and Anand, 2009).

The findings of this study suggest that the choice of tools used to facilitate knowledge management is directly related to general organizational guidelines, culture and infrastructure (Hansen et al., 1999). Moreover, the managerial approach has a great influence on the choice of tools that will be adopted by the team according to the manager’s previous experience and perception of the relation between knowledge strategy and tools as previously shown on the diagram. The choice of tools is also heavily influenced by the geographical distance between the team members (Corso et al., 2006). Being responsible for a large geographical region (EMEA) this PMO team members are dispersed in different locations and manage projects in different sites around the region. Therefore, there was the need for formalized tools for knowledge management such as the share points for example, but at the same time there is an intense effort towards tools that allow sharing of tacit knowledge, because the team members have very limited opportunities for informal interactions. Moreover, the geographical dispersion also influences the extent to which the tools will rely on IT, which in all cases will depend on the organization’s technological infrastructure. This topic will be further developed later on in this chapter. Finally, it was interesting to note that some of the tools were used for activities within a project life-cycle.
and others were dedicated to share general knowledge or knowledge on how to manage project. This may indicate that there are two sets of knowledge that should be addressed with different tools.

Moreover, some of the tools verified in the case study are supported by technological infrastructure in terms of telephone, internet, equipment and network. IT seems to play a significant role in this PMO team’s knowledge management processes. However, a good amount of knowledge management processes were also based on individual preferences, relationships and communication. This correctly implies that there could be a balance in the use of IT in order to match the needs of each team as well as respect resources available in the company. Similarly to the theoretical framework, the empirical research suggested that IT seems to influence the knowledge management processes in a less intense way than the previously mentioned enablers.

It is important to mention that all enablers are closely related and cannot be treated separately. Culture should be reflected in structure; it should provide the right mechanisms through tools and IT and should promote the right people skills. However, the need for tools and IT is not a recipe that applies to all settings. Whereas culture, people and structure have extremely relevant for all types of organizations, the use of IT and tools is related to the characteristics of the company and the specific users of the process. Larger companies like Dell have a huge number of employees which increases the need for robust knowledge management processes. Besides that, multi-location also pressurizes for more knowledge management processes tools which in this case depend on strong IT infrastructure. Smaller companies with co-located workers have more opportunity to promote knowledge management processes through informal relationships and face-to-face tools, thus relying less on formal tools.

Creativity and innovation are as stated before very important for the knowledge creation in an organization. Findings suggest that not only they are present in the researched project team, but they are highly encouraged and nourished. The leader of the project team is allowing her team members to freely think about the possible ways to improve the work, they are free to use templates and documents they find appropriate, there are no restrictions in that sense etc. In this way, the team is not too processed and focused on knowledge management, but allows knowledge to happen again and again (Inkpen, 2008).

Regarding business results, it is clear that knowledge management processes lead to positive business results (Damm and Schindler, 2002). However, the results of newly established team share point are still not visible and there is no tool set up for this kind of measurement. In this way, the results of the use of the share point can be mixed with the results of other knowledge management initiatives and the real influence of a particular tool cannot be separated. This might be a low point and an appropriate tool should be formed for this purpose particularly. Additionally, the results expected from the team members in the team are usually very high and a lot is demanded form them. Knowledge management can be helpful in these efforts.

Moving on to the processes, the empirical research suggested that inside the organization knowledge management seems to occur in two different levels: organization as a whole and project environment. This finding seems to be in line with the type of organization researched which is a projectified matrix organization (Arvidsson, 2009). From an organizational standpoint knowledge management processes are concerned with managing knowledge across different line functions. From a project perspective, however, knowledge management processes aim to
manage: first, knowledge from line functions that is relevant for the appropriate conduction of a project; second, new knowledge that is generated within particular projects; and third, to integrate knowledge generated by different projects. This study is particularly interested in knowledge management in project environments. Therefore, the processes at the organizational level will not be discussed. The diagram below summarizes the different levels of knowledge management processes suggested by the empirical findings:

Figure 10: Knowledge Management Levels in an Organization

As suggested by the findings, knowledge management in project environments happens at two levels. Firstly, the ‘within projects’ which is concerned with the management of functional knowledge relevant to specific projects and the new knowledge generated inside projects. This category, previously comprised as a part of the developed theoretical model, was recognized in the organization. Additionally, ‘across projects’ category comprises processes related to managing knowledge from one project that may be relevant to another project or future endeavors. This category emerged during the analysis of the empirical findings and suggested the need for updating previously developed model. The identification of two levels of knowledge management inside project environments is considered to be the main finding of this study, since this stance was not mentioned in the reviewed literature, but happened to exist in a real life organization. Therefore, special attention is given to the discussion on this category in the following part and the newly developed model is presented.

The identifications of those two levels also led the researchers to investigate the ownership and accountability of the project team towards knowledge management processes. The researchers support the findings that suggested that the implementation of appropriate mechanisms for knowledge management in project environments should be accompanied by clear expectations in terms of responsibilities to those processes, because the abstract and volatile nature of knowledge together with the fast paced environment of projects requires a consistent effort to manage it. The literature reviewed does not discuss the issue of accountability in this context which stresses the relevance of this finding.

It is also important to stress that the majority of the literature on knowledge management processes does not consider project environments, so while developing own model, authors of this research were applying knowledge management processes offered by the literature for
general settings and tried to adapt it to project field. Thus, the authors of this research believe that the project context of the researched team was very challenging.

As mentioned previously, even if the knowledge management process in the model is embracing following steps: assessment, creation, storage, transfer, use/reuse, the interviewees were asked in terms of project-cycle phases, due to their usual relation to this categorization. However, it is researchers’ task to extract the data from these phases and relate it to knowledge management phases from the model. This is what will be done in the following part while discussing each of the process’ phases.

‘Within Projects’

Firstly, **assessment** is taking place in Dell’s PMO team that was the subject of research, as expected by the authors (Eppler and Sukowski, 2000). This phase offers project team members an opportunity to get to know each other, to learn about others’ backgrounds, skills and therefore enter as prepared as possible in the following phases of their work (Eppler and Sukowski, 2000). However, the way assessment is performed in the PMO team in focus might be questioned. As findings suggest, people who are part of project teams are being assessed based on personal relationship and networking, without any formal tool used for this purpose. In order to achieve more objective results, in terms of what knowledge is present in the team and what is lacking, people might assess each other in a more structured way.

Secondly, **creation** of the knowledge is the next phase of the proposed knowledge management process. As advocated by academics (Alavi and Leidner, 2001; Eppler and Sukowski, 2000), it is the act of knowledge construction and development. Examples of new knowledge that is being created may be a particular approach to project planning, a new way of using of project management techniques or an innovative solution to any problem, or it can be a development of a team member’s skill. This is an activity that is happening permanently inside an organization, regardless of people’s awareness. However, the level of knowledge creation and its quality highly depend on the enabling factors and the level of creativity and innovation inside an organization. According to the findings, new knowledge is constantly being created within the project teams, with generally positive influences from both enabling factors and innovating initiatives. Regarding the project life-cycle phases, creation of the new knowledge cannot be related to any particular life-cycle phase, since it is possible to develop new knowledge both in pre-envisioning and in deployment stage of the project in Dell PMO team. The SECI process of Nonaka (1991) applies to the PMO team, transferring knowledge from tacit to explicit and vice versa, creating a “continual interplay between the tacit and explicit dimensions of knowledge” (Alavi and Leidner, 2001, p. 116).

The following phase presented in the model is **storage** related to the concept of organizational memory, introduced by Alavi and Leidner (2001). It is mainly related to the repository creation and placement of all the relevant information in it. The most important repository being used by the project team is share point dedicated to each program. In the case of ‘within project’ category, it is project share point, that embraces all the applicable documentation to a particular project and all the team members can access the repository and upload the documents.
Transfer is the next step of the process, which is taking place in different levels in an organization, among individual employees, between an individual and a group, within groups, across groups, from groups to whole organization and can be formalized and informal (Alavi and Leidner, 2001). According to the findings, this seems to be the case within the PMO team, including all the levels. However, within this category, the exchange is limited to project team only. Additionally, it is worthwhile mentioning that Sharing was mentioned very often by the interviewees, sometimes even mixed with knowledge management, which is obviously much broader term. This suggests that some of the elements of the knowledge management might be lacking, such as assessment tools, as mentioned before or supplementary tools for knowledge storage. According to Szulanski (1996), transfer stage encompasses initiation, implementation, ramp-up and integration. However, the model developed by authors of this researched has placed the last two stages in use/reuse step.

The last step of the suggested model is use/reuse of the existing knowledge, which is actually the goal of the whole process and hopefully leads to positive results.

The knowledge management process in this level should have a person who is a promoter of the activities, owner of the share point and responsible for all the activities. According to the findings of the case studied, it is project manager who is dealing with both soft and hard (physical) aspects of it. Firstly, he/she is supposed to promote the knowledge management initiatives within the team and deal with people’s possible reluctance. Secondly, project manager is in charge of the share point, to make sure that all the needed documents are uploaded etc.

It is important to note that all phases of knowledge management processes identified by the researchers in the theoretical model were recognized in the case study which indicates the suitability of the model for this setting.

‘Across Projects’

The other perspective of knowledge management processes is ‘across projects’ which seems to happen in the researched team simultaneously to the ‘within projects’ process. It is more related to softer aspects, such as how to manage particularly complex issues or how to influence stakeholders, for example, rather than specific knowledge on a business problem. Therefore it may be said that this level deals with a more tacit type of knowledge (Nonaka, 1991) that is harder to be codified, thus is mainly gained through relationships, communication and networking. However, this category does not exclude storage of data related to past projects and used while conducting current ones.

Assessment ‘across projects’ is related to evaluation of knowledge of the people within the team, not particularly related to a single project. It is concerned with identifying the absence of particular technical or general skills and knowledge needed for managing projects. The assessment may be conducted by the individual in need of a particular knowledge or by the leader of the team who spots the absence of a particular knowledge in the workers. It might take place, but not necessarily within this category.

Storage may seem difficult in ‘across projects’ category since, as mentioned previously, it deals with a softer type of knowledge. However, the case study suggested that a consistent effort in
terms of codification together with setting a proper ownership system may allow storage to some extent. In the case study this phase was represented by the separate team share point in the PMO team. This share point differs from previously mentioned project share point, since it is a repository that includes data from more projects performed by the team, not only related to a single project. This team share point is a new tool used by the team and its use seems justified, but the real results will be recognized only after some time of its usage. Taking into account the fact that it is often tacit knowledge that is being exchanged across projects, related to the soft skills, best practices and intangible ideas, it cannot always be placed in a share point or any other type of a repository. Therefore, depending on the type of knowledge, storage stage might not apply to ‘across projects’. This notion is in line with Inkpen (2008) concern that overemphasis on formalized knowledge management processes may represent a risk to innovation and experimentation limiting the organizational potential for learning. The case study suggested that this risk must be taken into account and a balance between approaches must be ensured by the management team.

The next phase is **transfer**, which is particularly stressed in ‘across project’ setting, according to the findings. This phase is related to the sharing of both the tacit knowledge between individuals and the codified knowledge stored in the previous phase. This phase may happen motivated by individuals that informally reach each other to debate issues and seek for help, or by initiative of the leader that sets formal moments for knowledge sharing. This is the case in the researched PMO team, when the team attends to team meetings where they discuss success and failure stories or in the times when people share knowledge from different projects during a car ride to and from the work.

**Use/reuse** is happening after the sharing is performed. In this stage a set of knowledge that was previously created in a project is finally influencing the decision making of another project in the sense of avoiding the same mistakes or implementing successful practices that worked well before.

It is important to highlight that the phase of **creation** was not included in the process ‘across projects’ because this process is concerned with managing the knowledge that has already been created previously in the projects. Therefore this process is a matter of assessing what is needed, storing what may be codified, transferring tacit and explicit knowledge and re-using it to generate positive impacts in future projects.

Regarding ownership on this level, it is possible to make distinction between soft and hard (physical) aspects. The leader of the PMO team has a crucial role in terms of creating the right expectations and requiring certain attitudes from the team towards knowledge management. Moreover it is the role of the leader to create the opportunity and the time for knowledge management across projects. That was seen in the case study through conference-call team meetings, face-to-face team meetings, mentoring and shadowing. The leader must support the soft aspects of knowledge management across projects whereas he/she may delegate the harder ones to someone in the team. In the case study having one team member assigned for setting-up and maintaining a team share point (Interviewee 5) illustrates to the rest of the team the importance of this practice as well as ensures its consistency overtime.

The question that may arise is if the ‘across project’ category is the same as knowledge management process in a regular, non-project oriented organization that was described in
According to those authors, steps that occur in knowledge management process in such organizations are creation, storage, sharing, use/reuse. However, the findings of this study suggest that not all the steps of the suggested process can apply to ‘across projects’ category in project environment of Dell PMO team. Assessment, storage, transfer, and use/reuse do occur, thus excluding creation in this case. Therefore, the authors of this study believe that in the particular project environment these two levels of knowledge management process differ from the process in non-project organizations. Additionally, particular project environment and all its characteristics contribute to the development of specific climate in project environments.

4.3 New Suggested Model of Knowledge Management

The figures that follow represent an updated model of knowledge management, changed after the empirical findings and the new category materialization. Due to the authors’ consideration to represent the model as clearly as possible, the model is divided in two separate figures.

The first one represents the ‘within project’ category, which is almost the same as the model described after the literature review was conducted. The only change is in ‘enablers’ part, where the highest contribution is given to cultural factor and therefore presented in a stronger color shade and as glowing. This is due to the results of the findings in the case study. However, the relation between technical and social enablers (Lee and Choi, 2003) still applies, giving higher weight to social (culture, people and structure) factors and is represented with the scales. All the other elements of the model are the same as before, thus proven in the case of Dell’s project team.

The second figure represents ‘across projects’ category. Due to the effect previous projects have on new ones within the project team and the knowledge they may bring, this category emerged. Empirical results revealed that there is a considerable difference between knowledge management in the project and between them. Therefore, as presented in the figure 12, knowledge from the previous projects lead to the knowledge management process ‘across projects’ consisted of assessment, storage, transfer and use/reuse. It is clear that the step ‘creation’ is missing, since there is no actual creation of knowledge across projects, rather the knowledge from previous projects is assessed, stored, transferred and used/reused. The light shaded steps, assessment and storage were deliberately colored in less intensive shades in order to represent that these two phases might happen, but not necessarily. On the other hand, sharing and use/reuse happen always in the ‘across project’ category.
Figure 11: Suggested Knowledge Management Model ‘Within Project’

Figure 12: Suggested Knowledge Management Model ‘Across Projects’
CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

In the last chapter of the thesis, conclusions of the study are presented, starting with the general conclusion. Following parts of the chapter are dedicated to contributions of the study and its limitations. Additionally, recommendations for Dell Computers are presented, after the gap analysis is performed and possible areas for further research are suggested.

5.1 General Conclusion

Managing knowledge in an organization can help in achieving better business results, due to the saving of valuable resources – time and money, non-repetition of the same processes, but use of the existing ones, standardization of documentation allowing its easier management, use of knowledge that individuals already have, its sharing and development etc. Moreover, knowledge management may be seen as a core competence in an organization. However, in order to achieve expected results, knowledge management should be set in a proper way, with enabling factors in organization that provide at least basic conditions for successful processes and finally effective processes leading to desired goals. Even though there is extensive literature on knowledge management in general, few researches have been conducted focusing on project environments and the particular ambiance that it brings within an organization. This study however focuses on knowledge management processes and tools in project environments. It is particularly challenging for the researchers of this study to step into almost untapped area and research with the assistance of the literature that does not completely match with the focal point of the research.

The purpose of the study is to research knowledge management processes and tools and their effectiveness. In order to do that, six objectives were defined and served as steps to conduct the research. Firstly, it was aimed to understand the characteristics of knowledge as addressed in the first part of the Literature Review. Secondly, enabling factors for knowledge management in project environments were expected to be identified and that was successfully done by listing a set of Enablers. Then, the need to identify processes and tools for knowledge management was fulfilled. That led to the following objective which was the development of a conceptual model. The following objective was concerned with the case study conducted at Dell Computers. Finally, the study was aimed to bridge the gap between academic suggestions and practice which was fruitfully accomplished through the development of an updated model derived from the empirical findings.

At the initiation of the research process, extensive literature was reviewed and papers written by many relevant authors in the field were analyzed. This resulted in the development of the authors’ own knowledge management process model, comprising different categories. The qualitative data collection and analysis followed, with the aim to test the suitability of the model and its application in real life. Five interviews were conducted with project managers in a project
team of a multinational organization, therefore having project environment as a focus of the research.

After the interview analysis, the results showed that the proposed process mainly applies. Nevertheless, new category that was not mentioned in the literature happened to exist in real life. This is particular for the project environments, and might not be applicable for different settings. The characteristics of projects in matrix organization seem to lead to knowledge management processes ‘within projects’ and ‘across projects’ as well as overall organizational knowledge management that was not in the focus of this research. These two processes happen in parallel and simultaneously, they are focused on different aspects of knowledge, but have the same goal, namely to manage knowledge as effectively as possible. Another implication is considering enablers, as factors that reinforce knowledge management processes. Basically, all the proposed enablers seem to apply in the company’s knowledge management efforts, but the importance of culture was found to be particularly high. Additionally, the results revealed that within different categories owners of the knowledge management efforts can be recognized. Owners can also be distinguished for ‘soft’ and ‘physical’ aspects of knowledge.

5.2 Contribution of the Study

As stated in previous parts of the text, knowledge management processes were mainly researched in organizational-wide context and usually in functional organizations. Project environment was excluded from the research and while reviewing literature, it was clear for the authors of this study that this type of organization was neglected by the academics. It might be due to the assumption that there is no difference between knowledge management processes in different types of organization. However, after this research is conducted, the authors can claim that there is a significant difference. Therefore, the fact that this study has entered into almost new field (knowledge management processes in projects) is the biggest contribution of this research. Moreover, while researching this ‘new’ field, authors have realized the existence of the new category in the processes that was not assumed after the literature review of knowledge management in organizations.

This study can contribute to the organization in focus, namely Dell Computers. After the analysis of semi-structured interview conducted with the project team, conclusions and recommendations are developed and can be helpful for the organization to improve the processes, since the benchmark was highly recognized academic literature and best practice. Additionally, the study can also be helpful for other organizations similar to Dell, with project teams, therefore, it can contribute to wider practitioner audience.

5.3 Limitations of the Study

It is significant to define the limitations of the study and thus contribute to its validity. Firstly, generalizations of the results should be avoided, since the study was performed on one company only, Dell Computers. Furthermore, it is focused on the Project Management Office of the Business Operations department of Dell Computers EMEA (Europe-Middle East-Africa).
Therefore, the results obtained in this study may apply to other companies, but not necessarily and this should be dealt with care.

Regarding data collection, semi-structured interviews were conducted with a senior manager and four project managers in the team. Even if interviewers had an Interview Guide, some questions were sometimes missed or forgotten and thus some information might lack. Additionally, except the interview with the senior manager that was conducted face-to-face, other four were telephone interviews. As stated by Bryman and Bell (2007), telephone interviews do not give as accurate results as face-to-face ones, due to the interviewer’s inability to see interviewee’s gestures and facial expressions. It is also more difficult for the interviewer to develop friendly relationship with the respondent through telephone.

Subjectivity of a qualitative research should also be mentioned as a possible limitation. The bias is always present in this kind of research and thus this study is not free of that neither.

5.4 Recommendations for Dell’s Knowledge Management

After the analysis of the data and its comparison to best practices presented in the literature, recommendations can be given to Dell Computers, in order to help them in knowledge management efforts and in achieving better results.

Regarding enablers, there seems to be no gap in Dell’s practice. All the enablers proposed in the model are present in the company and more importantly they all work efficiently in the Dell’s setting. As previously stated, culture is the most significant factor in the company, but could not work without other enablers simultaneously, namely people, structure, IT and tools.

Moving to the knowledge management processes, there seem to be some gaps in the practice of the researched project team. In the assessment phase, when knowledge of the project team is assessed and members get to know each other, decisions are made based on personal knowledge of the senior manager. There are no formal tools that help in the assessment, but mainly relationships and personal contacts of the senior manager are being used. Additionally and related to this, it might be helpful to have the database of all the team members, their basic information, skills, knowledge areas etc. It was said that the data base of the fifteen project manager in the team exists, but there is no information on people who work in their teams and who are to be assessed prior to any project. Furthermore, regarding owners of knowledge management processes, even if the authors’ could distinguish different owners in both ‘within projects’ and ‘across projects’ categories, as well as ‘soft’ and ‘hard’ aspects, it not clear enough what is the responsibility of each project manager regarding knowledge activities. Therefore, the authors of this study recommend involvement of knowledge management activities in Roles and Responsibilities, which is commonly used template in the organization. Thus, it could be helpful to define the tasks of each and every individual and to be clear on the expectation from their side.

Regarding project managers’ comments on the possible improvement opportunities, they mainly think that the time constraint is the biggest obstacle for effective management of the knowledge. Many of them believe that if more time was dedicated to it, knowledge would be better managed. However, due to the time constraints and constant everyday race with deadlines, people do not have enough time for other activities, such as knowledge management. Some of the respondents
suggested sessions on these issues once a week for an hour among the team. Additionally, due to the geographical dispersion of the team, more often meetings were suggested by the interviewees. It was elaborated in the previous parts of the text that the tools being used partly contribute and help to overcome the impediment of dispersion of the team. However, it was also mentioned that nothing can be as effective as live meetings, with both formal and informal gatherings of the team members. Therefore, more efforts should be made in order to overcome the barrier regarding team dispersion.

5.5 Areas for Further Research

As discussed in previous parts of the study, knowledge management processes and tools were not researched sufficiently in project environments. Only few papers were found on the knowledge management in teams, whereas project field was not in the focus of the academics.

The authors of this study have partially stepped into this area, since only one case study was conducted. More cases should have been done in this area in order to provide more reliable data. The area for further research could therefore be knowledge management processes and tools in project environments, particularly in matrix organizations that practice project work apart from functional. This is especially interesting in this type of organization due to the parallel existence of processes in projects, across projects and in organization as a whole. Additionally, the new category ‘across projects’ should be further researched. However, bigger samples are desired.

From the point of view of the performed research, it would be beneficial if other qualitative studies were conducted in order to compare and hopefully confirm the findings. It would be beneficial if it could be done through ethnographic research methods such as Shadowing (Czarniawska, 2007) that take into account interactions among people that may be not grasped through other methods that are more formalized. On the other hand, quantitative research in the field could also bring benefits due to their usual large amount of data.


APPENDICES

APPENDIX 1 - Interview Guide for the Interview with Senior Manager

Company’s overall Culture:

How do you think DELL’s culture supports/promotes knowledge creating/sharing/transferring/re-using within the organization? Explain, give details.

Do senior managers support knowledge management initiatives? How (through budget, headcount, metrics)?

Is knowledge management part of any recognition system, award, etc? Which one? How is it measured? How does it work?

Team’s Culture:

Is knowledge management supported in your team? Do you think that it is more you manager’s initiative or organizational-wide idea?

Do you have difficulties when you need to talk to others in the company? Are they ready to share their knowledge? Do you see your company as an ‘open-door’ company? When it comes to documentation, are you able to find documentation you need in the company?

Do you see some changes regarding KM support and initiatives in last few years? (question for employees who are longer in the company and if they say that KM culture is not very supported by the company)

What do you consider to be the factors that facilitate knowledge creating/sharing/transferring/re-using in your team? What do you do to enhance/develop those factors in your team?

Is the culture in your team based on mutual faith between team members?

Would you say your team-members are supportive, collaborative among themselves? Are they ready to share knowledge with the others?

Dell’s overall Structure:

How rigid or open is the relationship between the employees? How does it impact knowledge creating/sharing/transferring/re-using within the organization?

Who inside Dell’s structure is responsible for knowledge management?
Team’s Structure:

Who inside your team’s structure is responsible for knowledge management inside a project within the project team?

Who is responsible for knowledge management across projects within the PMO team? Why did you decide to have a person specifically assigned for that activity? Does she also lead other types of projects? How long has she been doing that? How easy was it for you to get her position approved internally?

Regarding decision-making, to which extent are the project managers autonomous to take decisions without referring to Susanne? (about Centralization)

To which extent are the PMO team activities covered by formal procedures? And how flexible those are in terms of PM’s making their own rules? (about Formalization)

People:

From the people’s perspective, what are the main competences that facilitate sharing of best practices? How does she make sure that she hires people with that profile or how does she develop those skills in the current employees?

How are the project team members selected? Who has the authority to pick or assign them? How do you map the skills/knowledge needed for a project and ensure that project teams comply with the skills required?

Tools:

Do you have the technological infrastructure to promote a knowledge sharing environment within our organization?

Which formal KM tools do the project teams rely during and after projects?

Do PM’s also have time/opportunity for informal interactions? Do they also share project experiences in those situations?

Assessment:

Do you have any system in place to capture and store your direct reports profiles, skills, expertise, etc? If yes, is this database accessible to other team members?

Before starting the work in a team, do people assess each other in terms of their knowledge and skills, so that they can know ‘who is an expert for what’? Formal meetings, trainings, seminars?
Do you have any system in order to understand and share the stakeholders’ expectations and goals among and between project teams? (including expectations of PM and those involved in the project work)

*Creation:*

In case you identify the absence of skills/knowledge in your direct reports, what do you do to bridge this gap? Which means do you use?

When one team member undertakes a course or attends an important meeting, do you have any process in place to share that knowledge with the other team members?

*Storage:*

Which type of knowledge is usually formalized into procedures, policies, templates, etc? What would you say is the proportion of tacit knowledge that is formalized? (in order to see codification vs. personalization strategies)

How do you decide, and who decides, which knowledge is relevant to be captured and formalized?

Which means do you use to store the appropriate knowledge?

How do you ensure that the knowledge stored in the past is updated and still relevant today?

*Transfer:*

How do you transfer the stored knowledge within your team and between project teams?

How do you promote the exchange of tacit knowledge within your team?

*Use/Re-use:*

Do you measure to which extent the knowledge stored/shared is actually put into practice? How?

Do you measure whether the knowledge management process achieves its objectives?

*Business Results:*

How do the current knowledge management process influence the business results? What kind of benefits does it deliver? Please comment on tangible and intangible aspects.

*Creativity/Innovation:*

Do you foster creativity and innovation in your team? How do you balance between ‘KM processes’ and creativity?
Closure Questions:

How well do you think that this process is working today? What improvement opportunities do you see in the current process?

What are the biggest hurdle in effective knowledge management in your team?
APPENDIX 2 - Interview Guide for the Interviews with Project Managers

Interviewee Background:

Could you please tell me a little bit about yourself? What is your academic background? How long have you been working for Dell? What was your career path inside the company?

Are you assigned to any specific project at the moment? Which project is that? What is your role in this project?

Questions Regarding KM:

Do you think that registering what you do and having access to information about your colleagues’ experiences, expertise, networking is useful in your daily activities? Why?

Do you think Dell’s culture supports/promotes knowledge creating/sharing/transferring/re-using within the organization? Explain, give details.

Do you feel that senior managers support/encourage knowledge management initiatives? How (through budget, headcount, metrics)?

Do you see your Dell as an ‘open-door’ company? Do you have difficulties when you need to talk to others in the company? Are they ready to share their knowledge?

Is knowledge management supported in your team? Do you think that it is more you manager’s initiative or organizational-wide idea?

Who inside your team’s structure is responsible for knowledge management inside a project within the project team?

Who is responsible for knowledge management across projects within the PMO team?

Do you have time/opportunity for informal interactions? Do you share project experiences in those situations? Is it useful to your daily activities? Why, explain.

In a formal way (team meetings/reviews, etc), how often do you talk to your peers about your current program, your experiences, etc? Do you think that it is enough? Do you think you could benefit from talking to them more often?

Besides personal interaction, is there any other way to get an understanding of what your peers are doing, some good practices or how they solved some type of problem that you may also be facing?

Today, do you think that relevant information to your program is readily available? When it comes to documentation, are you able to find documentation you need in the company?
How much time does it take for you to access this knowledge/information that is relevant to your program?

Do you think that your team has the technological infrastructure to promote a knowledge sharing environment?

Which tools/means offered by Dell do you use in order to register, access or share specific knowledge with your program team or with your colleagues?

Do you feel that the formal tools offered by Dell at the moment are enough to facilitate registering and sharing of best practices within the program teams and also between your peers? Do you feel the need for other tools? Could you give an example?

As per my conversation with senior manager, I understood that you have program share points for the different programs being run by each of the program managers in your team and also a team share point where general information is stored. Is that correct?

Could you please explain how do you manage your program share point during the program lifecycle?

- What kind of information do you register?
- Who has View or Edit access to it?
- How is this information used in the future?
- How is your communication with the stakeholders during the program?
- Besides the share point, do you register and share relevant information with the program team members in any other way? How?

When bringing in new people for the project, how is the knowledge part managed? How do the team members and team leader assess the knowledge of the new comers?

Do new comers get the opportunity to be mentored by more experienced staff?

Regarding phases of the project and their connection to KM, phases can be named: pre-envisioning, planning, build or development and deployment. Now, let’s try to discuss what happens in each of these in KM field.

- Firstly, regarding pre-envisioning, what are the main actions taken in this stage from your point of view?
- Then, in the Planning phase?
- And what about the Building phase?
- Finally, the deployment phase?
Regarding the team’s share point, when do you use it?

- Which type of information do you retrieve from there?
- Is it helpful? If that information was not in the team share point, where would you get it from? Would it take more time from you?
- To which extent do you think that your basic activities are covered by formal procedures? And how flexible those are in terms of PM’s making their own rules? (about Formalization)
- To which extent do you feel autonomous to take decisions without referring to Susanne? (about Centralization)
- Besides the share point, do you register and share relevant information with your peers in any other way? How?

When running a program (planning, implementing, etc), do you go back to the repository and search for previous success or failure stories from your peers?

How do you think that the fact that your team is located in different sites influence in the level of knowledge sharing between you?

Closure Questions:

Do you see some changes regarding KM support and initiatives in the last few years? (question for employees who are longer in the company and if they say that KM culture is not very supported by the company)

Do you feel that you are recognized by the effort you put into sharing best practices? How does it work?

In a program team, what do you consider to be the main competences that facilitate sharing of best practices?

Would you say your team-members are supportive, collaborative among themselves? Are they ready to share knowledge with the others?

Would you say that mutual faith between team members is an important element of knowledge management? How? Why?

Do you believe that the current process and tools that your team uses today, helps you to take fast and better decisions in any way? Did it help in your ramp-up in this position (for the new employees) How? Why?

What improvement opportunities do you see in the current process?

What is the biggest hurdle in effective knowledge management in your team?