UNDERSTANDING KNOWLEDGE AWARENESS IN ORGANIZATIONS

An exploratory study in FRANCE TELECOM

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A THESIS SUBMITTED

FOR THE DEGREE OF MASTER OF ENGINEERING

DEPARTMENT OF INDUSTRIAL & SYSTEMS ENGINEERING

NATIONAL UNIVERSITY OF SINGAPORE

2006

PREFACE

Except for commonly understood and accepted ideas, or where specific reference is made, the work reported here in this dissertation is my own and includes nothing that is the outcome of work done in collaboration. No part of the dissertation has been previously submitted to any university for any degree, diploma or other qualification.

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August 2006

SUMMARY

The purpose of this research is to offer new insights into the earliest stage of the intra-firm knowledge sharing process, the “awareness” stage in which organization members develop the awareness of potentially advantageous knowledge transfers. Increasingly, knowledge is distributed among employees and among various entities in firms. A key challenge for executives today is to design and support set of knowledge sharing mechanisms that help employees identify themselves relevant knowledge to be acquired.

A review of literature shows that researchers have investigated knowledge transfer issues with great diligence. By contrast, very little is known about the preceding “awareness” stage. Research on this matter is scarce, fragmented, and confined by disciplinary boundaries. Emphasis is placed upon the creation of an integrated perspective that would expose actionable implications useful to executives and employees.

Due to exploratory nature of this research, a case-study methodology is chosen. Data collection rests predominantly on a set of approximately-3-hour-long interviews with twelve senior managers and middle managers of a division of the FRANCE TELECOM Group, a large European telecommunication company. Six knowledge sharing events recently observed are presented using a “vignette” format. Those events suggest that three distinct types of awareness need to be developed by individuals before a knowledge transfer can happen: awareness of the existence of a piece of knowledge (or awareness of “what”), awareness of a knowledge source (or awareness of “where”) and awareness of knowledge need (awareness of “why”). Organization members are found to develop those three types of awareness through different patterns. Additionally, it is remarked that awareness is obtained through four different loci of search, namely: “classic search”, “scouting search”, “prince-charming encounter” and “serendipitous encounter”. The collection of 22 knowledge sharing

mechanisms encountered in our case reveals that different mechanisms have different impacts on the development of the three types of awareness. “Knowledge-orientation”, “Source-orientation”, and “Problem-orientation” are three dimensions against which knowledge sharing mechanisms can be evaluated. Similarly, the mechanisms observed are found to be more or less appropriate to certain loci of search. Combining the awareness-type/locus-of-search perspective brings forth an integrated knowledge sharing mechanism selection framework.

The above theoretical development built upon empirical work spawns important implications for practice and research. Executives can use the suggested framework to better assess the awareness landscape they have shaped. The design and decision to support a specific set of knowledge sharing mechanisms can derive and be based upon a clear rationale such as the identification of a lack in a certain type of awareness or the decision to support some particular loci of search. As with all research, this work presents some limitations. Further studies employing a hypothesis-testing approach would be appropriate to strengthen the generalizability and robustness of the herein advanced arguments. Promising questions over the relationships that may exist between the different types of awareness and on the influence of culture/organizational-structure are left unanswered.

AKNOWLEDGEMENTS

Writing this thesis has been like placing the last piece in a jigsaw puzzle. It has come after a long journey, with back-and-forth moves, surprises and deceptions, joys and tears (really!). At the end, the only things that remain are the great memories and the enormous satisfaction of having learned tremendously surrounded by great people. This adventure has maybe been the longest and most challenging educational accomplishment in my life, and, in the same way babies do not come originally from a single person, nothing of what I experienced would have been possible without the acute and kind help of many individuals.

First and foremost, I would like to express my deepest gratitude and appreciation to my direct supervisor Dr. CHAI Kah-Hin for his patient guidance, his ceaseless trust, as well as for the time and encouragements he offered at all times. My appreciation extends naturally to the ISE department's staff and to NUS for having made this learning opportunity possible and for having sponsored this research. Also, I am largely indebted to France Telecom, its managers and its teams for the time, interest, and insightful conversations they have generously given to this project.

Awie, Xiao Yang, Julien, Lin Jun, Xin Yin, and all the members of my research group are warmly thanked for their generous input, constructive criticisms, and stimulating discussions. Also, I owe a great deal to Zhou Peng, Ehsan, Damien, HongLing, Shabnam, Phil, Darrel, Yvain to cite only a few of my labmates and friends. The positive environment they created, the laughters we shared, their sense of friendship, tolerance, and curiosity made me appreciate even the most excruciating moments of this journey.

Last, but certainly not least, thank you to my parents and a thousand thanks to my patient and loving wife, and to my two sons, Andrew and Lino. You are the fire that enlightens and nourishes my heart, brain, and eyes. No wonder of the world would be worth pursuing without having you all beside me.

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1. Introduction

1.1. Background

The concept of knowledge has enjoyed an unprecedented popularity in the recent years. More precisely, since the 1990's, the recognition of knowledge as the ultimate source of lasting competitive advantage has been growing at a stunning pace among scholars and practitioners. A great number of striking citations from various leading management and organization scholars have echoed one to the other in management journals, newspaper, and magazines. For instance, Nanoka (1991, pp. 96) famously commented that "in an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge". Quite similarly, Peter Drucker (1993, pp. 42) stated that "knowledge is the only meaningful resource today. The traditional 'factors of production' have not disappeared, but they have become secondary". Another example is given by McGee and Prusak (1993, pp.1) who wrote that "in an information economy, organizations compete on the basis of their ability to acquire, manipulate, interpret, and use information effectively". The development of the knowledge-based view of the firm theory, the fast development of the knowledge management field, or the importance given to intellectual capital and organizational knowledge by top-management gives an idea of the rising attention it has recently received among scholars and practitioners.

To leverage on the knowledge resource, firms have been trying forcefully to improve knowledge creation within their organizations and have developed innovative solutions to acquire knowledge from suppliers, competitors, partners, and customers. Additionally, and contrasting with the above perspectives, it has been realized that firms do have within them a tremendously important, but often unsuspected, existing body of knowledge that, if shared appropriately, would benefit significantly to the performance of the firm.

The issue here is that, increasingly, knowledge is distributed, fragmented, among individuals and entities within the firm (Tsoukas, 1996). No overseeing mind can fully know what knowledge would be useful and where it will be useful (ibid). Galbraith (1995) asserts that the manager's responsibility is not to dictate information sharing activities but rather to serve as an architect in designing more efficient information systems and organizational structures.

The helplessness of management in taking advantage of the knowledge distributed throughout their organization finds its illustration in the famous complaint of Jerry Junkins, formerly chairman, president, and CEO of Texas Instrument, who lamented "if only IT knew what IT knows", or with its equivalent from Lew Platt, former chairman of Hewlett-Packard who said "I wish we knew what we know at HP" (O'Dell and Grayson, 1998, pp. 154). Szulanski (1996, pp. 10) points out that "one of the most surprising lessons from this attention to knowledge and learning is that mere possession of potentially valuable knowledge somewhere within an organization does not necessarily mean that other parts of the organization benefit from that knowledge. Organizations do not necessarily know what they know." O'Dell and Grayson (1998, pp. 154) echoes "executives have long been frustrated by their inability to identify or transfer outstanding practices from one location or function to another".

Considering the above arguments, intra-firm knowledge sharing therefore emerges as an essential and strategic activity for companies. It is critical for firms to bridge islands of precious knowledge, to find ways to leverage on the distributed and fragmented knowledge they already possess (Chai, 2000). Surprisingly enough, most research on knowledge sharing have oriented their endeavors toward the investigation of knowledge transfer issues where an identified piece of knowledge flows from a certain sender to a certain receiver (e.g. Gupta and Govindarajan, 2000; Szulanski, 2000; Argote and Ingram, 2000). Researchers have shunned the stage that comes before, the phase in which a future recipient comes to know about a relevant knowledge that would prove advantageous to transfer (Hansen, 2005). Considering the knowledge distribution and fragmentation, this stage sometimes called "awareness stage"

(Chai, 2003; Rogers, 1995) is revealed as crucial to explain how knowledge gets shared in organizations where no manager can promote knowledge sharing by dictating what knowledge should be transferred from whom to who. A recent article published by the Economist (2006, Jan 19th) asserts the following:

"There are three broad approaches to knowledge management. One is to create a system where all information goes to everybody, which is hugely inefficient; the second tells people what others think they need to know, which may not match their real needs; and the third enables them to find for themselves whatever they want to know. Companies like to say that they aim for the third approach, but they do not always find it easy."

This statement suggests that the lack of understanding that bears on the upstream stage of the knowledge sharing process not only affects the knowledge sharing performance of a firm but additionally makes it very difficult for management to design and support effective set of knowledge sharing mechanisms that would foster the development of awareness among organization members.

1.2. RESEARCH AIMS

This research explores the "awareness" stage of the knowledge sharing process, the phase preceding every transfer of knowledge and during which a future receiver comes to know about a potentially advantageous piece of knowledge. The first objective is gaining a better understanding of the nature of the "awareness" concept and spawning fruitful insights on the processes through which organization members develop it. The second objective, building upon the above, forcefully takes sides with managers' issues and aim at better comprehending how the knowledge sharing mechanisms designed and supported by management do affect the way individuals build up their awareness inside their organization.

1.3. Research approach

An extensive review of the extant literature in the field of knowledge management and organizational learning brought forth two observations. First, the concepts of "awareness" and "knowledge sharing mechanisms" are not very popular despite their acknowledged importance in the knowledge sharing process. Second, probably due to the elusive nature of "awareness", researchers have used a variety of contrasting perspectives, ranging from information seeking, knowledge sourcing to serendipity or social network analysis, in order to get onto knowledge pre-transfer and knowledge sharing mechanism issues.

The lack of theory and the observed fragmentation of theoretical perspectives strongly call for a research approach that exhibits an orientation toward theory building. Based on the nature of the research questions, a case-study methodology was chosen. A single master case within a large European telecommunication company was found appropriate in regard to the research objectives and it relied predominantly on a collection of in-depth interviews with senior and middle managers. Access to the company's internal documents and direct observations were additional and effective ways to reinforce richness and validity through triangulation of data sources and data collection methods.

1.4. Structure of the dissertation

This thesis is divided into 5 chapters. This section gives a brief summary of each chapter.

1.4.1. Chapter 2: Literature Review

This chapter proposes a review of relevant literature. It commences with an introduction to the elusive concept of knowledge and shows that knowledge is today an essential source of competitive advantage for firms. Knowledge sharing is described as a popular topic of the

knowledge management discipline. There is a broad understanding that its process is constituted of two important stages: an “awareness” stage followed by a “knowledge transfer” stage. While most of the attention has been given to the knowledge transfer phase, it is found that “awareness” is essential in the knowledge sharing process and that none of the various perspectives that more or less relate to this matter do answer satisfactorily some basic questions. What is more, very little is known on the way knowledge sharing mechanisms affect its development. A set of unanswered, albeit promising, research questions are formulated.

1.4.2. Chapter 3: Research Methodology

This chapter presents the research methodology and the rationale supporting it. It begins with a brief overview of the positivist and interpretivist research paradigms. The nature of the research questions as well as the theory-building-orientation of the study definitively calls for a case study approach. A presentation of the research design and implementation logically follows. It exposes the motivations behind the choice of a single master-case comprehending an embedded single-case design and details the sampling strategies that were adopted. The case predominantly rests on a collection of twelve in-depth semi-structured interviews. Data collection was reinforced by direct observations and an access to various company documents. Last, different techniques are employed to bolster the research validity and assure its relevance.

1.4.3. Chapter 4: Research Findings

This chapter exposes the collection of cases gathered from our study in the France Telecom Group and presents the findings that were derived from those cases. It commences with an introduction to the company and the division in which the study was conducted. It is found that three types of awareness (awareness of a knowledge existence, awareness of a knowledge

source, awareness of a knowledge need) need to be developed by organization members before they can consider engaging in knowledge transfer activities. A visual representation of the paths leading from non-awareness to complete awareness is presented. Two dimensions pertaining to the context in which the move from an awareness state to another occurs are proposed. The collection of 22 knowledge sharing mechanisms encountered in France Telecom Group lends support to the argument according to which mechanisms are essential both for the knowledge transfer stage and as well for the awareness development stage. Certain mechanisms appear more appropriate when it comes to develop a certain type of awareness in a certain locus of search.

1.4.4. Chapter 5: Discussion and Conclusions

This chapter starts by giving a structured account of the main findings originating from this research. From this summary, key implications for practitioners are drawn. A knowledge sharing mechanism selection framework is developed. Three distinct knowledge sharing strategies are discussed and rest on the focused improvement of different types of awareness through the promotion of specific sets of mechanisms. Next, implications for theories and research are highlighted. Last, limitations of the present work are recognized and several directions for further promising research are suggested.

1.5. SCOPE AND ASSUMPTIONS

This research focuses on the processes relating to intra-firm knowledge sharing. This research voluntarily takes cross-firm knowledge sharing issues out of its perimeter though it recognizes the importance of the knowledge shared with suppliers, competitors, or customers.

The rational underpinning a restricted focus on intra-firm knowledge sharing rather than simply on knowledge sharing is two-fold. First, understanding how knowledge is shared and

how it flows over the firm's frontier is a complex matter. In top of “usual” intra-firm knowledge sharing issues, it involves additional specificities such as cultural barriers, knowledge protection and legal issues (Szulanski 1996) or specific inter-firm relationship issues (strategic alliance, joint-venture...). Those specificities tied up to cross-firm knowledge sharing matters may overshadow the discovery of core factors that would explain how knowledge comes to be identified before being transfer among members of an organization. Secondly, literature emphatically recognized that knowledge from outside the firm is not the only important knowledge to be acquired. The knowledge residing inside the firm is as much essential and needs also to be discovered before being shared among the people who require it (Hansen, 2005; Szulanski, 2000).

Also, all along this research, a recipient-view of the knowledge sharing process is taken. This choice stems from the line of thought suggested by Tsoukas (1996) or the Economist (2006, 12th Jan) that argues that no knowledge management practice can effectively tell what knowledge should be transferred to who/where (knowledge push) and that therefore, knowledge management programs should orient their endeavors toward facilitating knowledge sharing under a knowledge recipient perspective (knowledge pull).

1.6. Conclusion

This chapter serves as an introduction to the research undertaken. It emphasized the importance of knowledge as a source of lasting competitive advantage for firms and pointed out that intra-firm knowledge sharing is a necessity for companies that strive to integrate and leverage the fragmented knowledge they already possess. Despite its critical role, very little is known of the stage preceding knowledge transfers, the stage during which a potential recipient comes to know about a relevant knowledge. Employing an case study approach, this research therefore aims at bringing into light the processes through which advantageous

knowledge transfers get identified and examines how knowledge sharing mechanism influence those processes.

2. Literature Review

2.1. Introduction

This chapter explores the large and fragmented body of literature that shows a connection with our interest in the first stages of the knowledge sharing process and in the knowledge sharing mechanisms used within companies. The aim of this review is not to gather an exhaustive collection of theories more or less related to a certain topic. Instead, and most importantly, it attempts to highlight and organize in a logical manner the contributions and limitations of existing research. The bottom line here is the refinement and formulation of a set of research questions that are proven to be important and unsatisfactorily answered.

With this end in mind, the following starts by setting up the background for this research with an introduction to the debate over the nature of knowledge, a presentation of the knowledge-based view of the firm, and a review of the most famous knowledge management frameworks. Putting aside knowledge creation concerns, the next section examines the knowledge sharing process and identifies to broad stages. This leads logically to a section that gets onto the “knowledge transfer” stage and which precedes a section on the “awareness development” stage. Overarching the two stages, a section on knowledge sharing mechanisms follows. The chapter in concluded with the refinement and precise formulation of a set of research questions as allowed by the above review.

2.2. Organizational Knowledge, an important but fuzzy concept

Before a more specific review of literature on the up-stream stages of knowledge sharing, the present section aims at grounding our field of interest by presenting the difficulty but nevertheless utmost importance of managing knowledge in organizations.

The discussion on the definitions of knowledge and a review of the characteristics that have been suggested demonstrate that the concept of knowledge is a delicate one. However, more and more researchers claim today that the move from an industrial age to an information age makes the need for managing knowledge a necessity for firms striving to build and sustain their competitive advantage. Last, a review of knowledge management theories and practices is presented as it introduces the next section that focuses on knowledge sharing issues.

2.2.1. "Knowledge", definition

Knowledge is a multi-facet concept that drew a great deal of attention in the recent years among disciplines as various as economics, philosophy, computer science, sociology, management science (Davenport 1998, Earl 2001). Before discussing issues relating to the management of knowledge, it may be pertinent to set up the context and begin by preliminary questioning the definition of knowledge and a review of its suggested characteristics.

To say little, knowledge is an elusive concept (Birkinshow 2002). Indeed, defining the nature of knowledge has been historically one of the most debated questions in philosophy. An entire branch of philosophy, called *epistemology*, is dedicated to this question. Even before that, in the dialogue of *Theætetus* written by Plato, Socrates discusses the difficulty of defining knowledge. Although the dialogue fails in settling upon a totally accepted answer, it spawns at the end a famous definition of knowledge. Socrates proposes that knowledge shall be referred to as a "justified true belief". More than two millenniums later, Gettier (1963) will severely

damage the proposed definition in the 1960s by providing situations where "justified true belief" proves to be a necessary but not sufficient condition to define knowledge. The debate is still raging.

With humor, Grant (1996, pp. 110) wrote that "since this question [What is knowledge?] has intrigued some of the world's greatest thinker from Plato to Popper without the emergence of a clear consensus, this is not an arena I choose to compete." This statement reflects acutely the stance taken by many researchers. Indeed, letting to philosophers the ambition of defining the elusive nature of knowledge, modern scholars from various disciplines have choosen pragmatically to define and classify knowledge in a variety of ways, and have proposed to study different characteristics under various perspectives (Huber 1991, Heldung 1994, Nokata and Takeuchi 1995, Spender 1996, Davenport and Prusak 1998).

This section encompasses a brief overview of the epistemological field. Additionally, it proposes a selective review of the most popular knowledge characteristics that have been suggested by a variety of leading organization and management science scholars.

Epistemology, a philosophical perspective

Epistemology is a branch of philosophy that investigates the questions relating to the "nature and grounds of knowledge especially with reference to its limits and validity" (Merriam-Webster dictionary). Many epistemological theories have been developed. Empiricism, idealism, phenomenalism, pragmatism, rationalism, relativism, skepticism are a few examples. Basically, those theories fall into two broad groups, each group adopting either an objectivist perspective either a constructivist perspective (see Table 1). The difference between the two perspectives lays in the assumed relationship between the knowing subject and the knowledge itself. The objectivist school of thought claims that knowledge is an "object", static and permanent, that is independent of the knower or group of knowing people.

At the opposite, constructivists view knowledge as something that is constantly rebuilt and highly dependant on the context and knower.

Dimension	Knowledge as Object (Objectivist)	Knowledge as Process (Constructivist)
Stability of knowledge	Static, formal, permanent, artifact	Fluid, dynamic, perishable, constant flux and evolution
Transferability of knowledge	Easily duplicated, communicated and shared	Knowledge exists within individual and cannot be shared directly; we know more than we can tell; tacit knowledge is personal and difficult to communicate to others
Epistemology/Ontology	Objective reality Knowledge is separated from the knower (Cartesian dualism)	Subjective reality Knowledge is embedded within culture, cannot be separated from context
Conception of knowledge cycle	The process of capturing, storing, using "knowledge" (emphasis on data and information conversion)	The process of knowledge conversion (emphasis on explicit/tacit conversion)

Table 1 - Perspectives and characteristics of knowledge (source: Schwen et al, 1998, p.79)

The opposition between those two philosophical perspectives results in different approaches when it comes to managing knowledge. Indeed, roughly said, when it comes to managing knowledge, objectivists would be more likely to find themselves among those who look at information technology whereas constructivists would rather focus on the human resources dimension. More details on the knowledge management field are presented in a following section.

Rather than adopting integrally one or the other philosophical perspective, modern scholars have attempted to classify knowledge using a variety of ways that often proved to be a middle ground between pure objectivism and pure constructivism.

2.2.2. Types of knowledge

Knowledge is today recognized as a critical asset for companies. Since defining knowledge is a very delicate issue, many scholars have pragmatically tried to suggest and study different

types of knowledge. The classification of knowledge and the identification of specific forms of knowledge is a way of reducing the "fuzziness" of the general definition of knowledge. However, there may be as many ways of classifying knowledge as there are definitions of knowledge. Indeed, as it as been discussed before, knowledge is a cross-discipline concept. Each very discipline, depending on the perspective it takes, is more interested by some classifications rather than some others. In this section, a collection of popular and widely used classifications are presented.

The Knowledge Pyramid

One famous classification of knowledge, called "knowledge pyramid" or "DIKW model", has gained popularity in the late 1980s. The model suggests a hierarchy with several layers, starting from data up to wisdom. Simply put, data are considered as a representation of facts, information as an interpretation of data (Bhagat 2002), knowledge as an application of information, and wisdom as the highest level giving the ability to understand why and when to use a piece of knowledge (Manuel 2005, Ackoff 1989). Whereas the model received a clear interest for being simple and explicative, it has fueled many debates bearing on the exact distinctions between layers with some scholars arguing that knowledge covers all layers from data to wisdom.

Know-what, know-how, know-why

A less controversial classification of knowledge distinguishes "know-how", "know-why" and "know-what". Garud (1997) argues that although knowledge is often confounded with "know-how", an emphasis should be placed on the "know-why" and "know-what" components of knowledge. The "know-how" also called procedural knowledge is an "understanding of the generative process that constitutes phenomena". In other words, it is the knowledge needed to perform some task. The "know-why" defined as an "understanding of the principles underlying phenomena" is also referred a "scientific knowledge". The know-how and know-why are different. One may know why a plane can fly but does not know how to make it fly.

In the same way, another can build planes and make them fly without understanding a single fluid dynamic principle. The last component of knowledge suggested by Garud is the "know-what", also called declarative knowledge, and defined by "an appreciation of the kind of phenomena worth pursuing". Garud argues that the learning processes, sources of acquisition, or properties of transfer and decay vary depending on the type of knowledge.

This classification of knowledge in know-how, know-why and know-what is not as simple as the above may let think. Scholars like Grant (1997) considers know-what and know-how as a single component he called know-that since both know-how and know-what refers to an understanding.

Tacit versus Explicit Knowledge

One of the most widely acknowledged classification of individual knowledge is the distinction between tacit and explicit knowledge. The concept of tacit knowledge, first introduced by the scientist and philosopher Michael Polanyi (1966), refers to the knowledge residing in the people's mind, the knowledge that may not even be "explicitly conscious and which does not need to be fitted into or processed through a conscious decision-making schema" (Spender 1996). The higher is the degree of tacitness, the more difficult it is to articulate the piece of knowledge. As it has often been cited in example, the knowledge needed to ride a bicycle is tacit.

It has to be pointed out that a number of scholars disagree with the strict distinction between tacit and explicit knowledge. The tacitness of knowledge is viewed as a continuum rather than a binary state. This relationship between tacit and explicit knowledge is complex and have received a great deal of attention from researchers (Lundvall and Johnson 1994, Cohendet and Steinmueller 2000, Cowan et al. 2000).

Knowledge Transfers and Knowledge Characteristics

Although tacitness has been the most studied dimension pertaining to knowledge transfer, it has been denounced by certain scholars that this unique perspective was not enough to satisfactorily explains the properties of knowledge transfers. Spender (1996) argues that the concept of tacitness is "under specified and means too many things to be a useful analytic term of analysis". Winter (1987) suggests instead four major dimensions to be related to the degree of easiness of a knowledge transfer, namely tacitness (sub-divided in 3 dimensions, tacit versus articulable, teachable versus not teachable, and articulated versus not articulated), oberservability in use, complexity and dependence of a system.

Bohn (1994) describes the process of knowledge acquisition as a succession of stages, starting from complete ignorance and ending up with complete knowledge, "nirvana". According to him, the knowledge become less and less tacit, and more and more explicit, as it is developed by individuals.

Organizational Knowledge

The organizational perspective is another interesting way to view knowledge. Although knowledge is always somehow linked to individuals, one can notice that even if "individuals come and go, organizations preserve knowledge, behaviors, mental maps, norms, and values over time". (Daft & Weick, 1984).

It is commonly agreed that knowledge can be held at different levels, either by individuals, groups, organizations, or more generally speaking, social networks. Hedlund (1994) proposes a categorization of knowledge according to two dimensions: organization level and tacitness (see Table 2).

	Individual	Group	Organization	Inter-organization domain
Articulated Knowledge	Knowing calculus	Quality circle's documented analysis of its performance	Organization chart	Supplier's patents and documented practices
Tacit knowledge	Cross-cultural negociation skills	Team co-ordination in complex work	Corporate culture	Customer's attitudes to products and expectations

Table 2 - Type and level of knowledge (source: Hedlund 1994, p. 75)

2.2.3. Knowledge as a competitive advantage for firms

The previous sections showed that knowledge, in addition to be a fuzzy concept, has been classified and categorized in a myriad of ways depending on the perspective taken by the researcher. The reason for such an interest in operationalizing knowledge concepts is that knowledge is widely recognized today as a critical, if not the main, source of competitive advantage. Nonaka (1991, pp. 96) has commented that "in an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge". Peter Drucker (1993, pp. 42) has stated "In fact, knowledge is the only meaningful resource today. The traditional 'factors of production' have not disappeared, but they have become secondary". The knowledge-based view of the firm claims that knowledge is the more important resource of the firm (Grant 1996, Drucker 1993), and going further, that "the creation and utilization of knowledge is the "reason d'etre" of firms" (Reinmoeller 2004). The firm is conceptualized as an "institution for integrating knowledge" by Grant (1996). Liebeskind (1996) adds that firms have particular institutional capabilities which give them an advantage over market contracting when it comes to protect knowledge from expropriation and imitation. She argues that it is this critical advantage that allows firms to protect and exploit sustainable competitive advantages.

The knowledge-based view of the firm can be viewed in a way as the essence of the resource-based view of the firm (Conner and Prahalad, 1996; Spender, 1996). Indeed, the resource-

based view of the firm is a theory of the firm which defends that the real enduring source of competitive advantage for companies stems from their unique resources, competencies and capabilities rather than their product market positions or their position in the competitive market structure (Rumelt, 1991; Hedlund 1994; Schendel 1996).

This view of knowledge as the strategic foundation, the most important resource, for the survival of firms applies to most, if not all, kinds of organizations. Zack (2003) claims that a common misunderstanding is to think that the knowledge-based view of the firm should be restricted only to firms that have knowledge at their core business (research institutes or consulting firms by opposition to industrial firms). The author proposes four characteristics to define the knowledge-based firm: process, place, purpose and perspective. To make it short, the knowledge-based company has processes that foster knowledge sharing and creation, has its knowledge sharing and creation activities not restrained by formal and strict boundaries, aligns their knowledge management processes with its strategy and last, views each activity with a knowledge perspective.

2.2.4. Managing knowledge and Knowledge Management

Despite its fuzzy nature, it is now widely agreed that knowledge is a critical resource for companies. Therefore, the question of managing optimally this strategic resource is raised and, to illustrate the importance of this question, one may cite the argument of Lei, et al (1996) which claims that the management of knowledge can be deemed as the key dynamic capability of a firm, and that, as a critical driver of the all the other capabilities and competencies (Bierly, et al, 1996), it may “form the basis of competitive advantages” (Lei, et al, 1996, pp. 549).

The activities relating to the management of knowledge has existed since time immemorable througth apprenticeship or group discussion, but the term of “knowledge management” took

an astonishing momentum in the 1990s with the support of Peter Druker, Nonaka and Takeuchi, and especially with the advent of a raging wave of information systems labelled “knowledge management solutions”.

Today, the cross-disciplinary field called “Knowledge Management” is more mature and the hype around it has faded away. However, the field still promises intruiguing and fruitfull questions. In the academic world, Argote (2003, pp. vi) defines research in knowledge management as the research focusing on a “fundamental set of questions” which relates to the creation, retaining, and transfer of knowledge within and across organizations, as well as the management of firm's stock of knowledge.

Actually, there are maybe as many definition of knowledge management as there are of the concept of knowledge itself.

Knowledge Management: People versus Technology

We have seen previously the two main epistemological perspectives of knowledge, namely objectivists versus interpretivists. This antagonism of perspective on the nature of knowledge leads more or less to two different approaches when it comes to managing knowledge.

In one hand, objectivists who view knowledge as an object that can be separated from the knower are more likely to define knowledge management as the management of knowledge stocks, using in its core, information technologies to improve the process of capturing, storing, and diffusing knowledge. Tuomi (2002) claims that technologies are powerful means to “connect distributed and loosely coupled 'pockets of innovation' and diffuse relevant information at high speed and relatively low costs”.

In the other hand, constructivists, who view knowledge as something closely related to the knower, ever-evolving, constantly being rebuilt, and existing only in a specific context, are more likely to define knowledge management as the management of flows with a special

concern to the management of people. As an illustration of this perspective, one can cite the work of Hedlund (1994) who proposes a knowledge management framework where recommendations bears on organizational structure, the patterns of communication among employees, the role of top management and excludes any specific references to a particular technology or information system.

Without explicitly referring to the duality of epistemological perspective, Hansen et al (1999) found that, at least in the consulting business, companies employs two very different knowledge management strategies that are contingent upon the business characteristics of the company. The “codification strategy” focuses on the use of technologies to codify, store and diffuse knowledge among employees whereas the “personalization strategy” focuses on people for sharing individual knowledge via person-to-person contacts. Companies that offer standardized and mature products, and manipulate mainly explicit knowledge are advised to lean toward the codification strategy. Companies that offer customized or innovative products and manipulate mainly tacit knowledge are advised to endorse the personalization strategy.

The knowledge management taxonomy suggested by Earl (2001) gives a clear and detailed view on the existing perspectives that have been taken by firms and scholars. His work is synthesized in the table below (Table 3). Basically, the duality of perspective between technology and people is found again. Earl labels three schools of knowledge management “technocratic” (based on information technologies) and three other schools “behavioral” because they are more concerned with the management of people. A single school of knowledge management is classified in a “economic” category and focuses on creating revenue streams from the exploitation of knowledge (patents, expertise selling,…).

Attribute \ School	Technocratic			Economic	Behavioral		
	Systems	**Cartographic**	**Engineering**	**Commercial**	**Organizational**	**Spatial**	**Strategic**
Focus	Technology	Maps	Processes	Income	Networks	Space	Mindset
Aim	Knowledge Bases	Knowledge Directories	Knowledge Flows	Knowledge Assets	Knowledge Pooling	Knowledge Exchange	Knowledge Capabilities
Unit	Domain	Enterprise	Activity	Know-how	Communities	Place	Business
Critical Success factors	Content Validation Incentives to provide content	Culture/Incentives to share knowledge Knowledge networks to connect people	Knowledge learning and information unrestricted distribution	Specialist teams Institutionalized process	Sociable culture Knowledge intermediaries	Design for purpose Encouragement	Rhetoric artifacts
Principal IT contribution	Knowledge-based systems	Profiles and directories on Internet	Shared databases	Intellectual asset register and processing system	Groupware and intranets	Access and representational tools	Eclectic
Philosophy	Codification	Connectivity	Capability	Commercialization	Collaboration	Contactivity	Consciousness

Table 3 - the 7 schools of knowledge management (adapted from Earl, 2001)

Managing knowledge and strategy

While one may belong to the technocratic, economic or behavioral school of knowledge management, it is broadly accepted that knowledge is one of the most valuable resource for companies and that, therefore, considering the knowledge-based view of the firm, this resource should be carefully managed with the clear objective of serving the strategic goals of firms. Interestingly enough, Zack (1999) states that the relationship between "knowledge management and business strategy, while often talked about, has been widely ignored in practice" (ibid, pp. 126). In other words, the researcher denounces the difficulties encountered by many executives as they try to link the organization's competitive strategy to the knowledge management initiatives taken or to be taken. Zack (1999) introduces a figure to illustrate how the knowledge gap identified in a firm should be directly derived and aligned with the strategic gap of the organization.

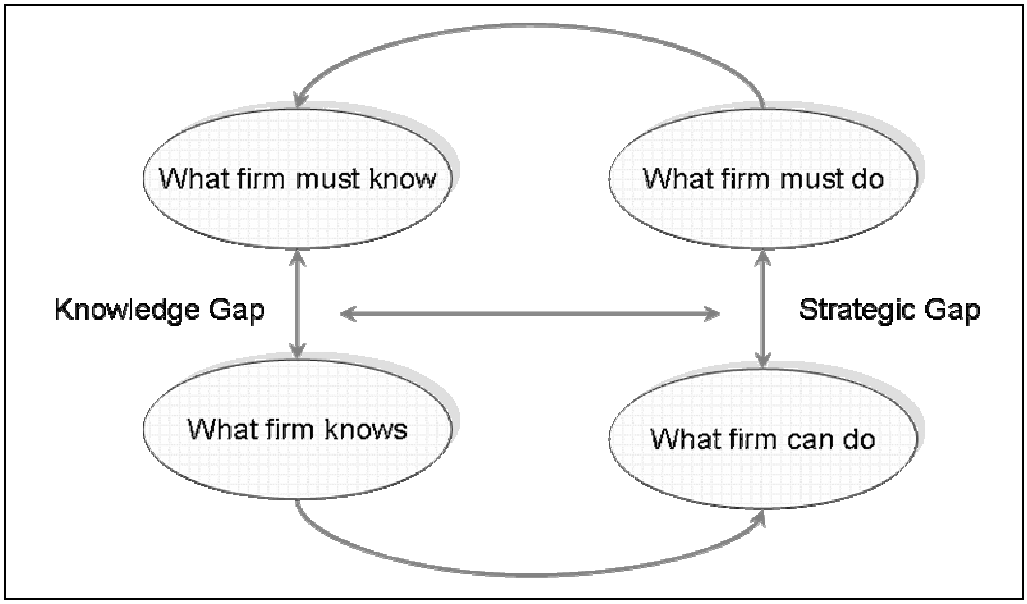


Figure 1 - The relationship between knowledge and business strategy (Adapted from Zack, 1999)

Bierly and Chakrabarti (1996) proposes four generic types of knowledge strategy based on the position taken by firms on the balance between internal and external learning, their preference for incremental or radical learning, their learning speed, and the breadth of their knowledge base. Applying this framework to the U.S. pharmaceutical industry, the researcher distinguish 'explorers", 'exploiters', 'loners', and 'innovators' and find that 'innovators' and 'explorers" tend to be more profitable. Following a similar line of thought, Zack (1999) suggests that the exploitation-versus-exploration and internal-versus-external knowledge acquisition orientation of the firm are the two important dimensions which describe fruitfully a firm's knowledge strategy. According to the researcher, the combination of these two dimensions determines the degree of aggressiveness of the knowledge strategy of a company (see Figure 2).

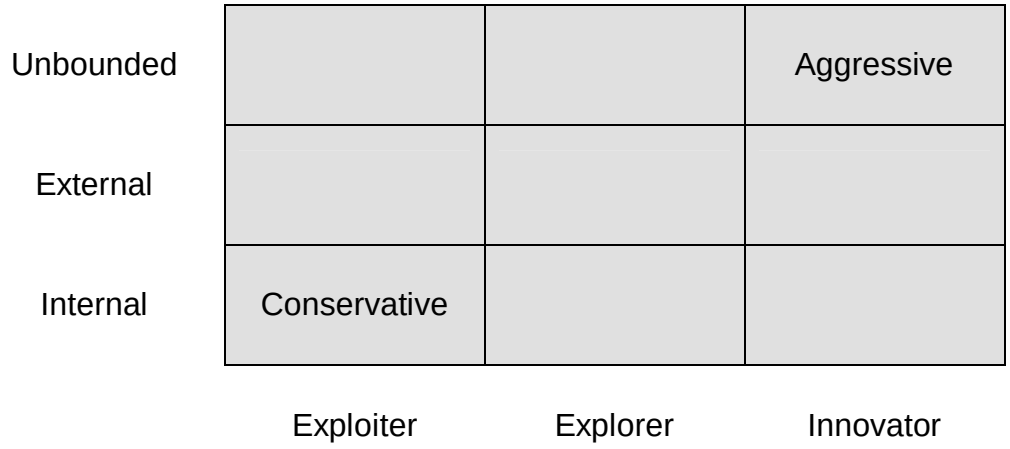


Figure 2 - Knowledge Strategy and Degree of aggressiveness (Adapted from Zack, 1999)

The identification of different types of knowledge strategy provides an interesting framework to think about the knowledge management positioning of companies and the strategic implications that can be derived from it. To get more specific on the interplay between knowledge management and the company's processes, the following brings forth as a conclusion the latest development on knowledge management and its view as a process.

Knowledge Management as a process: an integrated framework

To better understand what sub-components can be identified in the knowledge management concept, it may prove interesting to view the knowledge work performed in organization as a process. Davenport et al (1996 pp. 54) found for instance that the "knowledge works' primary activity is the acquisition, creation, packaging, or application of knowledge". One can consequently expects that knowledge management is concerned with improving the efficiency and effectiveness of all those activities. There is an astonishingly large number of frameworks that aim at describing and characterizing the knowledge processes which fall under the scrutiny of the knowledge management field (Wong and Aspinwall, 2004). As an illustration, the reference can be made to Rubenstein-Montano et al (2001) who review a long list of knowledge sharing frameworks found in literature. The researchers cite, explore, relate, compare, and criticize the work of Wiig (1999), Liebowitz (2000), or Beckman (1999) in this

area. Lietbowitz (2000) for instance suggests a 9-step process pertaining to Knowledge Management with (1) 'Transform information into knowledge' (2) 'Identify and verify knowledge' (3) 'Capture and secure knowledge' (4) 'Organize knowledge' (5) 'Retrieve and apply knowledge' (6) 'Combine knowledge' (7) 'Create knowledge' (8) 'Learn knowledge' (9) 'Distribute and sell knowledge'. Another example of Knowledge Management framework is the 4-process-based framework of Bose and Sugumaran (2003) which presents Knowledge Management as constituted of four major processes which are (1) 'Knowledge identification and generation' (2) 'Knowledge codification and storage' (3) 'Knowledge distribution' (4) 'Knowledge utilization and feedback'.

Listing a long and exhaustive list of knowledge management frameworks would not make sense in regard to our research interest. However, the point we intend to make here is that, in its most simplistic form, the process-view of knowledge management basically distinguishes two broad stages: knowledge creation and knowledge sharing (Zack, 1999). For each of these stages, many sub-stages can be found and combined. This perspective finds the support of Markus (2001) who states that "knowledge processes are often characterized by whether they involve *knowledge creation* (as in research or product development) or *knowledge reuse* (as in sharing best practices or helping others solve common technical problems). Knowledge creation is often viewed as somehow more important, more difficult to manage, and less amenable to information technology support. However, the effective reuse of knowledge is arguably a more frequent concern and one that is clearly related to organization effectiveness.". The term of knowledge reuse and knowledge sharing have a common meaning since sharing knowledge is also reusing knowledge. The main difference between the two terms comes from the fact that in *knowledge sharing*, the source of knowledge and the re-user of knowledge are two different persons (sometimes called "source" and "recipient") whereas in the case of knowledge reuse, the source of knowledge and the re-user of a piece of knowledge can be the same individual (Markus, 2001). For instance, a consultant can store his

or her work relating to a specific study and use it back again for another client at a later time. Taking a pragmatic stance, the divergence between knowledge sharing and knowledge reuse is not huge and for the sake of simplicity, it can be stated that knowledge management comprises two main stages: knowledge creation and knowledge sharing.

The deliberate choice of this study is to consider only issues that relate to the knowledge sharing stage of the knowledge management field.

2.2.5. Organizational knowledge: Conclusion

This first section of the literature review chapter gave an introduction to the knowledge management field and perspectives, and it reviewed its massive and disparate associated body of literature. The aim was to set the ground for a more focused discussion on knowledge sharing, individual awareness and knowledge sharing mechanisms. To summarize the above briefly, it can be said that, since the beginning of time, the term *knowledge* has been at the center of ferocious debates sharing the underlying objective of defining explicitly a meaning for this common word. To this date, no clear consensus has emerged and the old question remains open with an entirely dedicated branch called “epistemology” in the philosophy field. Most modern scholars have pragmatically decided to go round the issue of defining knowledge and have oriented their endeavors onto the identification of important types of knowledge or critical characteristics. For instance, the terms “know-what”, “know-how”, “know-why” were introduced. Michael Polanyi (1966) coined the very famous concept of knowledge *tacitness*. The reason for such a craze over knowledge in the recent years is the increased understanding that in the today’s world, knowledge is a key element for firms to consider, or, going further, that knowledge may be the ultimate source of competitive advantage for firms. The knowledge view of the firm has gained more and more momentum since. This theory claims that the *raison d’être* of firms is the “creation and utilization of knowledge” (Reinmoeller 2004) and views firms as institutions for integrating knowledge

(Grant, 1996). The term of *Knowledge Management* has known a period of hype in the 1990s as it was getting more and more popular among scholars and management executives. Since then, it has known alternated periods of interest and strain. More mature today, it can be said that 2 main stages emerge when considering the knowledge management process: on the first hand is the management of *knowledge creation* and on the second hand is the consideration of knowledge sharing.

The interest of this research leans more toward the knowledge sharing aspect of knowledge management. Consequently, the following section is concerned with the review of existing literature on knowledge sharing processes and draws together various perspectives originating from different fields of research.

2.3. KNOWLEDGE SHARING PROCESSES

The previous section presented briefly various views on knowledge management. Furthermore, it reviewed several frameworks that suggest different ways of managing knowledge. One area of the knowledge management field has received a great deal of interest: Knowledge Sharing.

Knowledge sharing is closely related to knowledge transfer. Many times, the two terms have been used interchangeably with no distinctions being made between them. However, knowledge sharing has been called so because it involves more than a one-way transfer of knowledge from a source to a recipient. Von Krogh (2003: 273) claims that knowledge transfer is actually a two-way transfer of knowledge since it requires a mutual adjustment of both the source and the recipient. Baalen (2005) uses knowledge sharing instead of knowledge transfer because the former term refers more explicitly to the social process involved when transferring knowledge.

To better understand the exact nature of knowledge sharing, this section proposes to review different models and theories that relate to the knowledge sharing process. The very mature and famous communication model will be presented first since knowledge sharing requires in its core communication to be established. Then, with a special attention to processes, the also-very-mature field of diffusion of innovation is presented as a special case of knowledge sharing. Follow a brief overview of the processes found in the organizational learning literature and a specific section dedicated to the Nonaka's knowledge conversion model. This section is concluded with the presentation of various integrated knowledge sharing frameworks that emphasizes the Chai's findings in this matter (2000).

2.3.1. The communication processes

The communication discipline has investigated the processes involved while sharing knowledge, or more exactly information, long before the emergence of the knowledge management field. Part of the terminology commonly used in knowledge sharing theories, with words such as "sender"/"receiver" or "channel", was borrowed from communication theories. Therefore, despite its focus on information, language and cognition, a very brief overview of this mature discipline offers many helpful insights that serves complementary as an introduction to the more specific knowledge sharing issues discussed later on.

It is hard to write about communication theories without mentioning the Shannon and Weaver's model of communication (1949). It is with no doubt one of the oldest and most pervasive theories of communication, and it remains highly influential even after it has endured more than 50 years of criticisms and attempts of improvement (Dennis and Valacich, 1999). Terms like *message fidelity*, *multiple channels*, *information loss*, *source credibility*, or *feedback* are commonly used today in the communication field and originate from the work of the two researchers. Their model is concerned with the communication between two individuals/entities with one transmitting a piece of information to the other. The model

encompasses 5 elements that intervene at different stage of the information transmission process (see Figure 3). First of all comes the *information source* that produces a message. The message is encoded into a signal by the *transmitter* before being transmitted through a *channel* and received by the *receiver* with more or less differences compared to the original signal because of noise sources. Last, the receiver reconstructs the message from the signal and the *destination* finally gets the message.

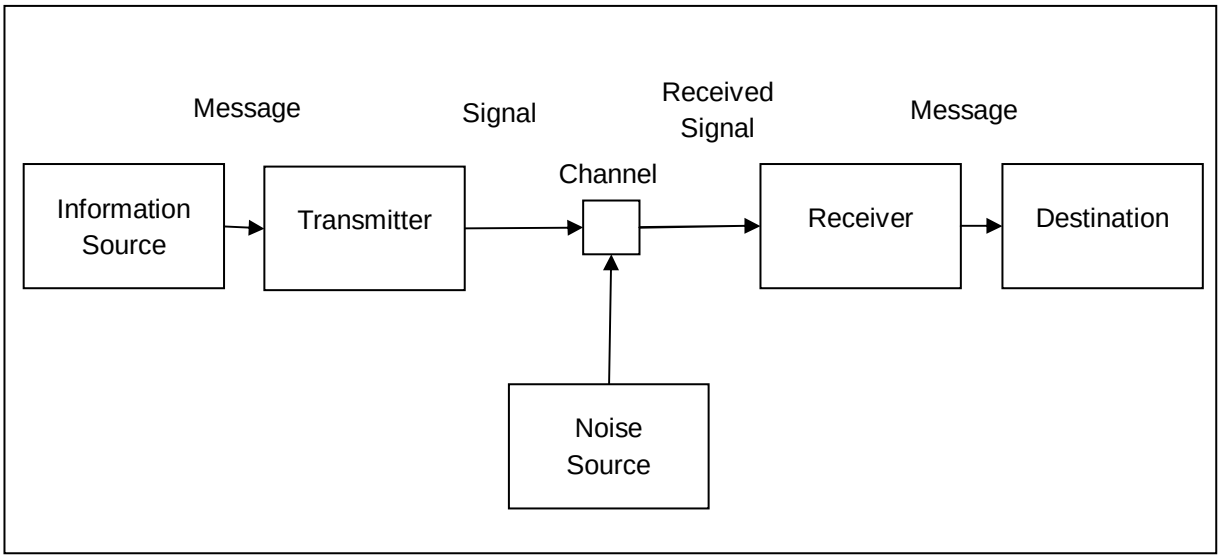


Figure 3 - Shannon and Weaver's model of communication (Shannon and Weaver, 1949)

This communication model suggested by Shannon and Weaver (1949) has been criticized for many reasons. One of the main critics is the over-simplification of human communication. Indeed, a wide agreement among scholars exists and it gives support to the argument that human communication involves more than a linear process between an active sender and passive receiver (Rogers and Kincaid, 1981). Despite the abundant critics, the model is still very much cited though, and its process perspective offers an interesting way to discuss about communication, and more importantly for us, knowledge sharing. As everyone may guess, research bearing on communication theory does not limit itself to this model. At the opposite, communication theory is even hardly considered as a field in itself because of the multitude,

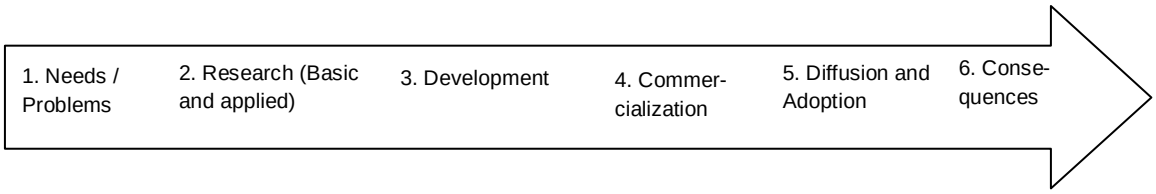
the variety and the diversity of theories that place themselves under its label (Craig 1999). Reviewing the myriad of theories on communication would bring little to this discussion.

Instead, and without wandering from communication theory, the next section proposes to present some of the diffusion of innovation theories as they offer a process perspective fairly relevant to our knowledge sharing interest.

2.3.2. Diffusion of innovation processes

The title of forefather of the diffusion of innovation theory is often attributed to Gabriel Tarde, a French sociologist, who wrote, in the early 90's, about what he called the "theory of imitation". But the theory took its real momentum only in 1962 with the publication of the book "Diffusion of innovations" written by Everett Rogers. Since then, Everett Rogers was revealed as a leading figure in this field and has published the 5th edition of his famous book in 1995. In a nutshell, diffusion is defined as the process by which an innovation is communicated through certain channels over time among the members of a social system (ibid). Rogers (1995) distinguishes 5 categories of innovation adopters depending on the time of adoption. First come the innovators, followed respectively by the early adopters, early majority, late majority, and last, the laggards.

Taking a more global perspective of the process that brings forth innovations, Rogers proposes an "Innovation-Development process" that encompasses 6 consecutive stages (see Figure 4.).



Note from the author: "These six phases are somewhat arbitrary in that they do not always occur in exactly the order shown here, and certain of the phases may be skipped in the case of certain innovations.

Figure 4 - Six main phases in the Innovation-Development process (Adapted from Rogers 1995, pp. 133)

The above offers useful insights on the global processes through which innovations get adopted by large parts of a social system or on how they get developed by different stakeholders at different stages. However, the frameworks that are given do not get onto the issue of understanding how the decision to adopt an innovation is taken at an individual level. The "innovation-decision process" developed by Rogers do address this question.

Indeed, the researcher (Rogers, 1995) defines this process of adopting an innovation as the process through which an individual (or other decision-making unit) passes:

- from first knowledge of an innovation,
- to forming an attitude toward innovation,
- to a decision to adopt or reject,
- to implementation of the new idea, and,
- to confirmation of this decision.

Now may be the time to outline the relationship between knowledge sharing, communication theory, and diffusion of innovation. There is no doubt that the three fields present huge differences, in the focus they take, the paradigm they use, or the research approach they employ. However, they share a common interest which is the sharing of some pieces of information, innovations, or knowledge among a group of individuals/entities. Table 4,

adapted from the work of Chai (2000), gives an idea of the similarities as well as the differences that may be found while comparing the respective areas of research.

	Content	**Channel**
Communication	Signal/Message/Information	Channel / Medium
Diffusion of Innovation	Innovation	Diffusion Mechanism
Knowledge Sharing	Knowledge	Knowledge Sharing Mechanism

Table 4 - Comparison between components of communication, diffusion of innovation, and knowledge sharing theories (adapted from Chai, 2000)

Despite the difference of content shared or of channels used across the different fields, it may not be unreasonable to think that drawing together the different perspectives above bring forth a cross-discipline view of a same object. In other words, we argue here that the brief review of those disparate fields can outline the influential processes and important stages on which further knowledge sharing theory can be built upon.

Close to knowledge management and knowledge sharing, the next section extends the discussion by presenting a few models and processes encountered in organization learning literature.

2.3.3. Organizational learning and learning processes

Organizational learning and knowledge management unquestionably share many similarities. The main difference between the two fields comes from the focus they take. Organization learning is more concerned with studying the processes by which organizations acquire knowledge whereas knowledge management focuses more on managing the knowledge that has been learned (Argote, 2005).

Since knowledge sharing is a significant way of acquiring knowledge, a brief overview of the organizational learning processes that have been suggested in literature seems appropriate at these stage.

First of all, an important distinction can be made between two famous different types of learning in organization: single-loop learning versus double-loop learning (Argyris and Schon, 1978). Simply said, considering a set of defined objectives, single-loop learning refers to the process of continuously learning and adapting his or her own actions in order to get as close as possible to reaching the objectives. In contrast, double-loop learning is not concerned with learning what actions would be best suited to achieve the objectives, but instead, refers to the learning that bears on the search of the right set of objectives. A concrete example of why single-loop and double-loop learning should both be deemed as critical for improving the firm's chance of survival is given in a study of Kaplan and Norton (1996) which focuses on the utilization of balanced scorecards as an effective management system. The two researchers argue that balanced scorecards can be effective if, first, they allow employees to measure how well the actions they have taken have brought them near the strategic targets given by top management (single-loop learning), and second, if they allow top management to verify the effectiveness of the given targets in regard to the ultimate firm's objectives (second-loop learning). Adapting a table from Fiol and Lyles (1985), Romme and Dillen (1997) propose to summarize the differences between the two types of learning as follow:

	Single-loop learning	**Double-loop learning**
Characteristics	Based on repetition Routine Within existing structures	Based on cognitive processes and understanding Non-routine Aim at changing rules and structure
Results	Simple context Change of behavior or performance level Problem-solving capacity	Complex context Change of mental frameworks Development of new myths, stories and cultures

Table 5 - Single loop and double loop learning (Romme and Dillen, 1997 adapted from Fiol and Lyles, 1985)

Letting aside the distinction between single and double-loop learning, Daft and Weick (1984) propose a simple and explicit 3-stage process model of organizational learning. It starts with

"scanning" during which organization members collect data from their environment. The second stage is named "interpretation". Individuals give a meaning to the data that have been collected. Last comes the "learning" stage which involves a response or action based on the interpretation.

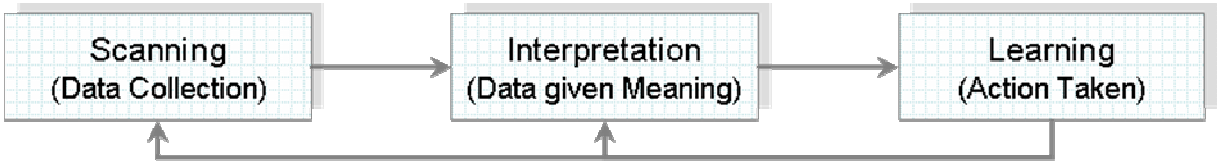


Figure 5 - Relationships among Organizational Scanning, Interpretation, and Learning (Daft and Weick, 1984)

One point worth noting about this process-view of organizational learning is that the model above echoes astonishingly the innovation-decision process proposed by Rogers in the diffusion of innovation field. "Getting the knowledge of an innovation" can be easily related to "data collection", "forming an attitude toward innovation" can be related to "data given meaning", and "decision to adopt or reject" fits well the label "Action taken".

Another model of organizational learning process, considered as well to be in the field of knowledge management, is the very famous Nonaka's spiral of knowledge (Nonaka, 1991).

2.3.4. Nonaka and the knowledge conversion process

In the early 1990's, the hype over the role of knowledge in organization took off and many executives started to realize how important knowledge creation and sharing was to the survival of their business. Nonaka took interest in understanding how Japanese firms were so successful at producing continuous innovation within their firms. The outcome of his research was a model of knowledge creation and transformation called spiral of knowledge. His article "The knowledge creating company" published in 1991 and the book titled identically, published in 1995, were ranked respectively at the 6th and 1st position in term of number of

citations in the meta-review of knowledge management and intellectual capital literature conducted by Serenko and Bontis (2004).

Nonaka and Takeuchi (1995) made the simple and fecund assumption that the tacit/explicit characteristic of knowledge is a critical, albeit often over-looked, characteristic of knowledge. According to the 2 researchers who place their focus on continuous innovation, knowledge in organization is created as the result of the transformation and interplay of knowledge between the tacit and explicit dimension. Four basic patterns are identified (see Figure 6).

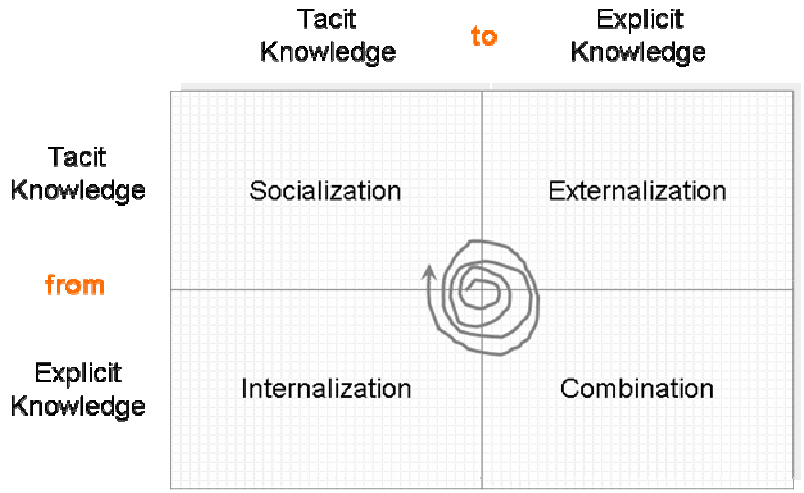


Figure 6 - The Nonaka 's Knowledge Conversion Process (Source: Nonaka and Takeuchi, 1995, pp. 71)

This framework sheds lights on numerous knowledge creation and sharing events within companies. For instance, Hoegl and Schulze (2005) list several knowledge sharing mechanisms, and for each of them, the researchers indicate the knowledge conversion pattern it mainly uses. An "experience workshop" becomes a place for *socialization* where existing tacit knowledge is shared to bring forth new tacit knowledge among participants. The writing of "experience reports" or the interviewing of experts is related to the *externalization* process. The use of databases is deemed as fostering the *combination* process while the use of research services to acquire and integrate external professional explicit knowledge is seen as an instantiation of the *internalization* process.

The conversion-process view, inherent to the Nonaka and Takeushi's model, insists on the continuous creation of new innovative knowledge through the above transformation process but does not emphasis the sharing or re-use of certain knowledge already residing in the organization and "ready to consume". Before getting to the processes relating more specifically to knowledge sharing, the following section tackles knowledge re-use issues with a deliberate focus on the processes it encompasses.

2.3.5. The knowledge reuse process

As mentioned earlier, knowledge sharing and knowledge reuse are intertwined concepts. According to Markus (2001), sharing knowledge within a company is a way to reuse the knowledge residing in the firm. The first difference stems from the understanding that knowledge can be reused without being shared in the case where the "re-user" uses his or her own knowledge. The second and more fundamental difference comes from the accentuated focus on knowledge repository found in the knowledge reuse literature where knowledge capture, coding, packaging, and storage is emphasized.

Taking a different stance, Majchrzak, et al (2004) present knowledge sharing as an initial stage in which a source's knowledge is captured and, according to them, knowledge re-use should be viewed as a later stage in which an entity locates useful pieces of shared knowledge and uses it.

Whereas the terminology defended by different researchers may vary, the process from the capture of knowledge to its actual re-use is something most researchers agree on. Markus (2001), for instance, proposes that the knowledge reuse process is constituted of the following stage: capturing or documenting knowledge, packaging knowledge for reuse, distributing or dissemination knowledge, and reusing knowledge.

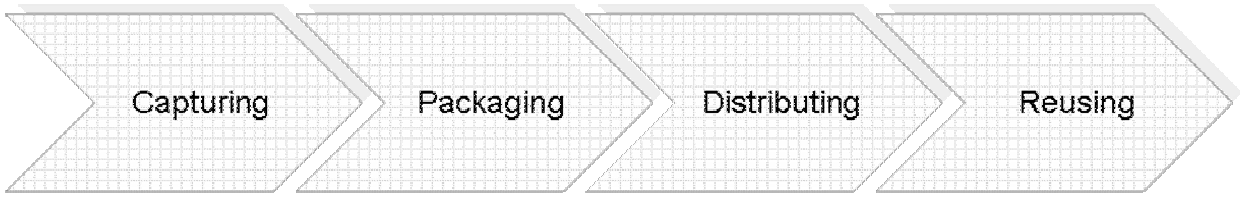


Figure 7 - Knowledge Reuse Process (Source: Adapted from Markus 2001)

The above process highlights the importance given to the capturing and packaging stages in the knowledge re-use literature and it gives sense to the IT-focus found in this discipline.

More interested in the search and actual use of existing shared knowledge, Majchrzak, et al (2004) present from a totally different perspective another model of knowledge re-use process that excludes the capturing and packaging stages (see Figure 8).

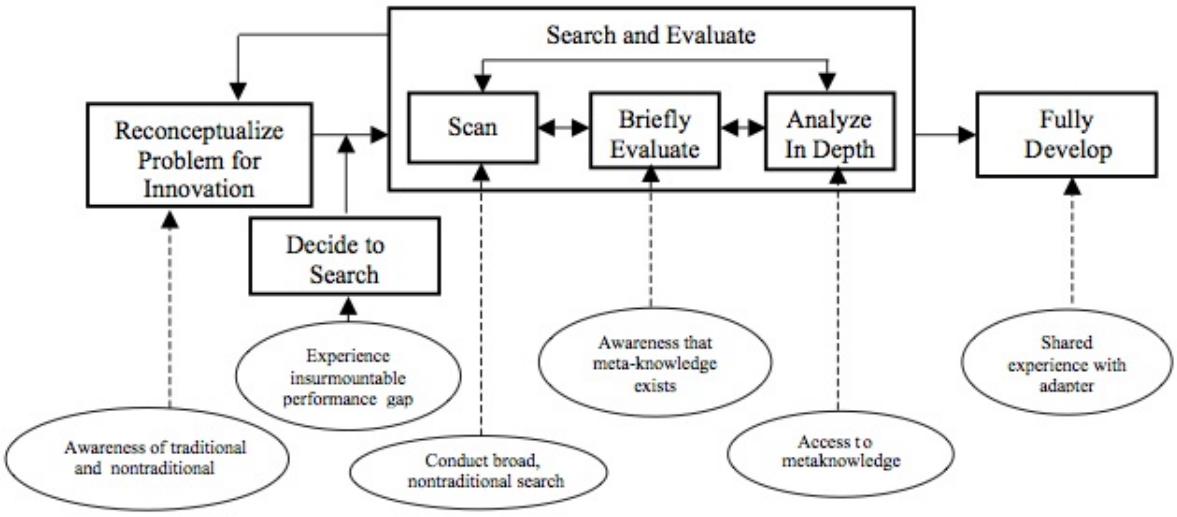


Figure 8 - Model of Knowledge Re-Use Process for Innovation (source: Majchrzack, 2004)

The process is divided in three main phases. First comes the definition of a problem that need to be addressed in regard to the innovation pursued. Second is the phase of search and evaluation of the existing knowledge available within or outside the organization. Last is the phase where the pieces of knowledge deemed of interest are actually acquired.

Those different models of knowledge re-use processes give a hindsight that may prove useful when considering what specific knowledge sharing theories have been developed in literature.

The following section gets onto this subject and proposes a short review of different knowledge sharing frameworks and processes.

2.3.6. Knowledge sharing frameworks and processes

The previous section has presented briefly the knowledge re-use perspective. Compared to knowledge sharing, it includes an important phase of capture and packaging of the existing knowledge that resides in and is spread throughout the organization. What is more, knowledge re-use theories often regard knowledge storage and retrieval as critical issues.

In this section, the interest lays on the short review of the knowledge sharing processes that have been identified in literature.

Actually, many models exist and their orientation mainly depends on the perspective taken by researchers. Focusing on learning and social networks, Laycock (2005) describes a learning cycle that is claimed to represent the process through which knowledge get shared in the organization he worked along with (see Figure 9).

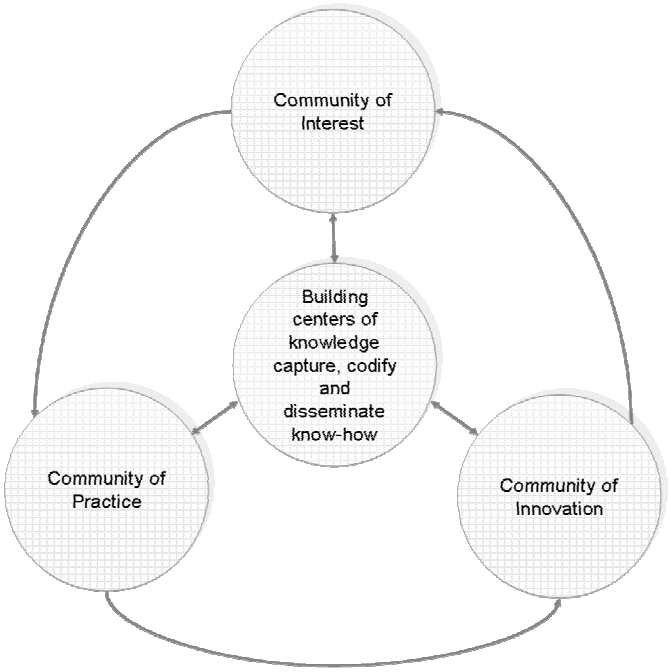


Figure 9 - Knowledge Sharing and Learning Cycle (Source: Laycock, 2005)

Closely related to knowledge sharing, knowledge transfer is a topic that has received a great deal of interest in the recent years. While developing the term of stickiness to describe the difficulty of transferring knowledge, Szulanski (2000) proposes a four-stage process (see Figure 10). It makes sense to present it here as it significantly helps to understand how knowledge get shared and transferred from an entity to another in an organization. This model takes the perspective of the receiver of knowledge.

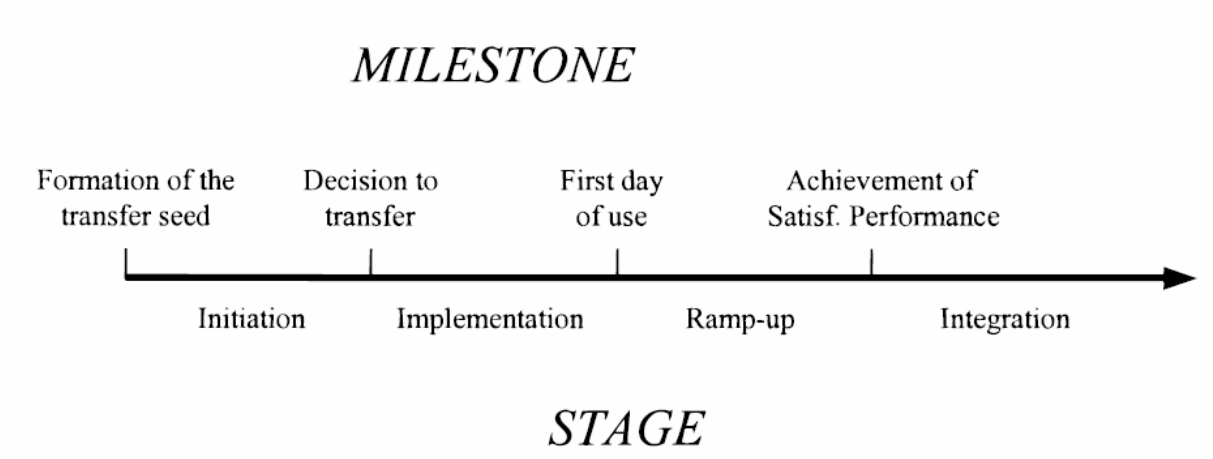


Figure 10 - Knowledge Sharing and the Process of Knowledge Transfer (Source: Szulanski, 2000)

The first milestone which launches the “initiation” stage is the “formation of the transfer seed” which refers to the identification of a gap and of the knowledge to address the gap. Follows the decision to transfer and therefore the implementation stage during which an emphasis is placed on the exchange of information between senders and recipients. Once the recipient start using the new knowledge, a ramp-up stage starts in which the recipient tries to solve with the sender's help the problems that show up. Last, the knowledge transfer process is concluded by an integration stage in which the use of the new knowledge acquired by the recipient becomes gradually routinized.

In a recent article, Hansen (2005) recognizes the importance of the knowledge transfer stage in knowledge sharing but also emphasizes the need for better studying what comes before. Rephrasing his research question using the Szulanski’s terminology (2000), Hansen desires to

open the "formation of the transfer seed" box and steer its study toward obtaining a better understanding of how this "transfer seed" is formed. He suggests that two main stages occur before any transfer of knowledge. First comes the decision to seek knowledge and then occurs the ensuing search process.

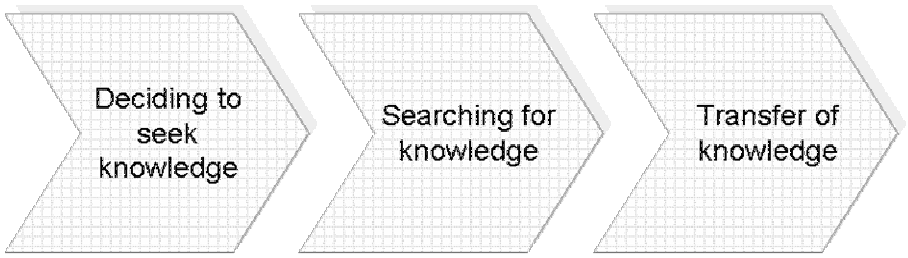


Figure 11 - A 3-stage Knowledge Sharing Process (Adapted from Hansen, 2005)

Building upon the work of Rogers (1995) and Szulanski (1996), and in line with the Hansen (2005) perspective, Chai (2000) places his focus on bottom-up knowledge sharing. His research brings forth a synthetic model of knowledge sharing process that encompasses 4 stages (see Figure 12). Interestingly enough, it includes an "awareness" stage preceding the knowledge transfer stage.

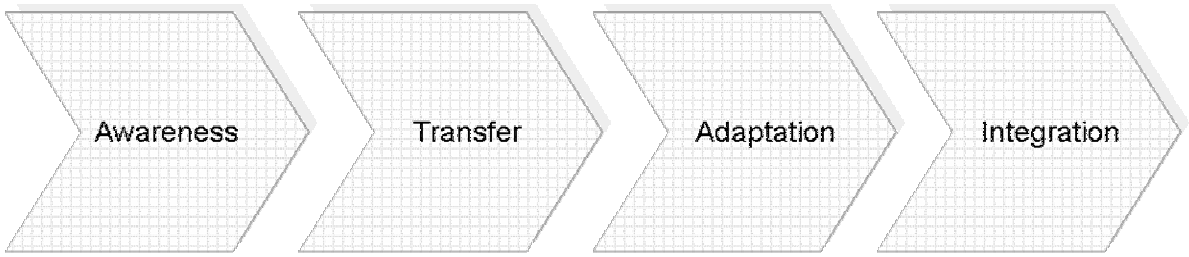


Figure 12 - A four-stage Knowledge Sharing Process (Source: Chai, 2000)

The term of *awareness* refers to the stage during which an eventual receiver comes to know the existence of an advantageous piece of knowledge that would be worth transferring. The *transfer* or *share* stage follows and constitutes the phase in which the relevant knowledge previously identified is acquired by the receiver learning from a knowledge source. The *adaptation* and *integration* stage follow and refers respectively to the phase in which the knowledge transferred is adapted to fit the receiver's environment and needs, and the phase

after that, in which the adapted knowledge gets integrated into the receiver's business processes as a routine.

To synthesize the above review, it looks like a wide agreement bears on at least two basic stages that would unquestionably take place in the knowledge sharing process: First, an "awareness" stage in which the "transfer seed" is formed (Szulanski, 2000), in which the potential receiver takes the decision to seek knowledge and look for pieces of it that could be transferred (Hansen, 2005), in which the eventual recipient comes to know the existence of a relevant knowledge (Chai, 2003). Secondly, a "transfer" stage during which the identified piece of knowledge gets transferred from the knowledge source to the recipient.

2.3.7. Knowledge Sharing Processes: Conclusion

The very first section of the literature review has introduced the delicate and arousing concept of knowledge in organization. It has demonstrated its importance and highlighted the needs of firms to manage their knowledge effectively in order to build the sustainable competitive advantage necessary to their survival. The knowledge management process was divided in two broad categories: knowledge creation issues and knowledge sharing matters.

Interested in reviewing the processes pertaining to the latter category, the above section has examined a large body of literature sprawling from communication theories to specific knowledge sharing models. The communication field, with a long and rich history, has revealed long ago some critical terms, like "source", "receiver", "channel", "content", commonly used today to describe knowledge sharing processes. Closer to the concerns of this section, the diffusion of innovation theory exposed a diffusion process that closely relates to the one that can be imagined for knowledge sharing, starting with getting to know the innovation, forming an attitude toward it, taking the decision to adopt it, and finally, implementing it before concluding by confirming the choice of adoption. In the organizational

learning literature, several learning processes have been proposed. To this followed a brief presentation of the famous Nonaka and Takeushi's model of knowledge conversion in which knowledge is created from the sharing and interplay of knowledge between its tacit and explicit form. To complete the picture, a reference to knowledge reuse theories was given before tackling specifically the findings bearing on knowledge sharing processes. The bottom line from this review of so many disparate but intertwined fields was that the knowledge sharing process can be deemed as made of two critical phases. An "awareness" stage during which the receiver of knowledge comes to know the existence of a relevant knowledge and in which, what Szulanski (2000) calls, the "knowledge transfer seed" is formed. Follow a "transfer" stage during which a piece of knowledge gets transferred from a knowledge source to a recipient.

The transfer stage was found as being far from trivial and automatic (Szulanski, 1996) and received a great deal of attention in the recent years. In contrast, despite its critical importance, it is little to say that the "awareness" stage has been overlooked and that no mature integrated theories covers this process (Hansen, 2005).

The following section explores the abundant literature touching on knowledge transfer issues and reviews the leading perspectives in this field. The section that succeeds tackles the less popular, albeit critical, "awareness" stage and brings disparate disciplines together to build a more complete comprehension of this knowledge sharing phase.

2.4. KNOWLEDGE SHARING: THE TRANSFER STAGE

Although one can find many ways to define knowledge sharing and describe its process, it is widely agreed that at least two stages take place. First of all, knowledge sharing can be initiated only if recipient and sender are aware of what knowledge should be transferred from who/where (in the recipient's side) to who/where (in the sender's side). Then, once this

awareness is shared among senders and recipients, the transfer of knowledge can eventually begin. Following the view of Darr and Kurtzberg (2000), it can be said that a knowledge transfer is complete only once the piece of knowledge transferred is used by the recipient.

A great deal of attention has been given to the knowledge transfer stage (Hansen 2005, Zander & Kogut 1995). Linda Argote for instance has chosen to commit significant time and resources to the study of knowledge transfer among groups and individuals (e.g. Epple and Argote, 1996; Argote and Ingram, 2000; Argote, 2003; Kane, Argote and Levine, 2005). She defines the term of *knowledge transfer* as the process by which one unit of an organization, such as a group or a department, is affected by the experience of another (Argote et al, 2000).

This section starts by introducing the concept of knowledge "stickiness", a term used by scholars to describe the difficulty of transferring certain types of knowledge. Next, the issues of sender and recipient's characteristics are tackled and this is followed by a brief presentation of the media-richness theory. Last, a review of the impact of culture and of the difference of culture concludes this section on the knowledge transfer stage.

2.4.1. Knowledge transfer and knowledge stickiness

Contrary to initial popular beliefs, it has been found that the transfer of organizational knowledge, far from being "costless and instantaneous", is often a "laborious, time consuming and difficult" process (Szulanski 2000, pp. 10). To specifically refer to the difficulty of transferring knowledge, Szulanski (1996) and von Hippel (1994) have famously coined the term of knowledge "stickiness". This term has been a seminal concept that has summarized and initiated significant research endeavors.

One school of thought defends that the characteristics of the knowledge itself is highly explanatory of the difficulties an organization may have transferring its knowledge among its entities. Building upon the work of Rogers (1983) and Winter (1987), Zander and Kogut

(1995) state that the speed of knowledge transfer is influenced by five main characteristics of the knowledge that is transferred: its “Codifiability”, “Teachability”, “Complexity”, “System dependence” and “Product observability”. It is hypothesized that a highly codifiable, highly teachable, not complex, neither system dependant, and highly product observable knowledge will easily flow throughout an organization while the converse situation will result in an extremely slow, if not impossible, diffusion of knowledge among organization members.

Szulanski (1996) suggests that the degree of causal ambiguity and the degree of unprovenness are the two important predictors of knowledge stickiness. On the first hand, the causal ambiguity concept is concerned with the difficulty of understanding for sure how a piece of knowledge contributes to the better performance of a system that, in itself, comprehends numerous other factors and interactions worth considering. This raises the question of the replicability, in different contexts, of the positive effect assumed to originate from a certain piece of knowledge. It is fairly intuitive to think that a piece of knowledge that has worked in a certain environment, but for which, it is not sure how it contributed to better performance, will be found less attractive for a transfer to another site than one piece of knowledge for which the causal effect is not so ambiguous. In the other hand, the unprovenness of knowledge refers to the lack of proven records supporting the usefulness of a piece of knowledge. One more time, it makes sense to assume that a piece of knowledge that has been used with great success all around the world for a long time will find few barriers on its way when considered for a transfer to a new site.

This “stickiness” of organizational knowledge, or the challenges faced by firms when it comes to move knowledge throughout an organization, does not stem uniquely from a certain collection of characteristics of the knowledge to be transferred. With no surprise, knowledge sources and recipients have a role to play as well in the knowledge transfer process.

2.4.2. Knowledge transfer and focus on senders and recipients' characteristics

It has been claimed above that having effective transfers of knowledge within an organization is not as simple as one may assume. Certain characteristics of the knowledge transferred do affect the chance of obtaining a successful transfer from a knowledge source to a recipient. Szulanski (1996) who coined the term of knowledge "stickiness" pays attention not only to the characteristics of the knowledge itself to predict the difficulties encountered in a transfer. He additionally highlights the importance of the sender and of the recipients. Source lacking motivation to share, source being not perceived as reliable, recipient lacking motivation to receive knowledge, recipients lacking absorptive capacity, and recipients lacking retentive capacity, are the five variables relating to the source or the recipient that have been suspected by Szulanski (2000) to impede the knowledge transfer process.

Not far from the Szulanski's work, and following a perspective that finds its root in the communication theory field, Gupta and Govindarajan (2000) propose an overarching theoretical framework to explain intra-firm knowledge transfers. The model they suggest aims at explaining how inflows and outflows of knowledge are transferred in and out of a party. Five major elements are presented, three of them referring to the characteristics of the source and recipient. Indeed, in addition to the importance of the *knowledge's value* that is possessed by the source and the existence, quality and cost of *transmission channels*, the two researchers claim that inflows and outflows of knowledge requires respectively the *motivational disposition of the source unit* regarding the sharing of its knowledge and the *motivational disposition of the recipient* regarding its acceptance of incoming knowledge, completed by an *absorptive capacity*. The notions of motivation of the source, motivation of the recipient, as well as the concept of absorptive capacity of the source, are components similarly shared in the Szulanski's model and the Gupta and Govindarajan's model.

It has to be mentioned here that the term of "absorptive capacity" of the source has drawn the interest of numerous researchers studying knowledge-transfer-related issues. For instance, concerned with the study of inter-firm knowledge transfer and its relation with strategic alliances, Mowery et al. (1996) find some partial support for the hypothesis according to which the 'absorptive capacity' of an organization help explain the extent of technological capability transfer.

In a totally different orientation, the consideration of the characteristics of source and recipient has also been used fruitfully in other contexts relating to knowledge transfer issues. For instance, focusing on the identity of sender and recipient can be a productive way to categorize knowledge transfers and understand their characteristics. Dixon (2000) suggests five different types of knowledge transfers labeled as serial transfer, near transfer, far transfer, strategic transfer, and expert transfer.

To summarize the above, it can be said that the properties of the knowledge to be transferred are not the unique factors to look at when attempting to explain the effectiveness or non-effectiveness of certain knowledge transfers. The source's characteristics and the recipient's characteristics are components that should be regarded with at least as much attention.

The following section aims at completing the picture on knowledge transfer by introducing the notion of media. The importance of this concept originating from communication theories gets reminded in the work presented by Gupta et al (2000).

2.4.3. Knowledge transfer and media: the media richness theory

The concept of media was originally made popular in the communication field. As the plural form of the word *medium*, it refers to the carriers that allow information to be transmitted among people or between entities. Without entering the debate on the distinction between information and knowledge, this concept finds its relevance here because it has often been

used to describe the "communication bridge" that is used by a sender to transfer its knowledge to a particular recipient (e.g. Gupta, et al, 2000).

The term "media richness" has been coined by Daft and Lengel (1984, 1986) to describe the ability of certain media to process "rich" information in organization (Vickery and all, 2004). In a nutshell, the core proposition claimed by the media-richness theory is that richer communication media are better suited than lean communication media when it comes to transfer information in situations of uncertainty or equivocality (Dennis and Valacich, 1999). Uncertainty refers to the lack of information whereas equivocality, sometimes called ambiguity, is associated with the "existence of multiple and conflicting interpretations about an organizational situation" (Daft and Lengel, 1987).

The exact nature of the richness concept has been debated and not all researchers agree on what it should be. The proposition of Daft and Lengel (1987), one of the most used definitions, is that the richness of a media channel is a blend of 4 distinct criteria; *immediacy of feedback*, *multiple cues* (e.g. vocal inflection, body gesture), *language variety* (the range of meaning that can be conveyed with language symbols), and *personal focus* (referring to the ability of the media to convey personal feelings and emotions).

Medium	Feedback	Channel	Source	Language	Information richness
Face-to-face	Immediate	Visual, Audio	Personal	Body, Natural	Highest
Telephone	Fast	Audio	Personal	Natural	High
Electronic (email, EDI)	Fast	Limited visual	Personal	Natural/Numeric	High/Moderate
Written, Personal (letters, memos)	Slow	Limited visual	Impersonal	Natural	Low
Written, Formal (bulletins, documents)	Very slow	Limited visual	Impersonal	Natural	Low
Numeric, Formal (computer output)	Very slow	Limited visual	Impersonal	Numeric	Lowest

Figure 13 - Media characteristics and richness of information (Source: Vickery, 2004; adapted from Daft and Lengel, 1984)

The theory claims that matching the media richness with the equivocality of a task results in better performance (Daft and Lengel, 1994; Dennis and Kinney, 1998). The seminal work of Daft and Lengel and their theory have endured many critics and its validity has proven to be problematic with conflicting results from various studies (e.g. not support found by Dennis and Kinney 1998 versus support found by Vickery 2004).

For sure, the media richness theory is not specifically concerned with knowledge sharing but is rather focused on communication and information exchange. However, the approach and findings have proved fruitful in helping researchers derive new concepts and theories applying to the field of knowledge transfer and more generally, knowledge sharing (Chai, 2003). Further development on knowledge sharing mechanism selection theories will be presented later on in this chapter.

2.4.4. Knowledge transfer and culture

The previous sections took interest in the properties of the knowledge transferred, the characteristics of the source and the recipient, and the various media through which knowledge get transferred. Taking a higher-level view on the environment in which knowledge transfers happen, organizational culture or more generally social culture is also known to play an important role here. Two perspectives co-exist. Either it is the common organizational culture which recipient and sender belong to that affects knowledge transfer. Either it is the difference of culture between receiver and recipient that affects the way knowledge gets transferred.

This paragraph, concerned with the former situation, gets onto the issues pertaining to organizational culture viewed in the light of a knowledge sharing perspective. Schein (1992) famously defines organizational culture as the shared values, beliefs, and practices of the people in an organization. A certain culture may encourage employees to share their

knowledge and learn from other while another may support knowledge hoarding or a “silo” mentality. It is broadly acknowledged that how to create a positive knowledge sharing culture within a particular organization is a central question to be addressed by any knowledge management program (e.g. Reid, 2003). A large body of research has been dedicated to this issue and it has brought forth various elements of an answer. For instance, it was found that perception of the management’s support for knowledge sharing and perception about a positive social interaction culture can be deemed as a good predictor of the knowledge sharing culture (Connelly et al, 2002). Dermott, et al (2001) suggest that, to create and foster a knowledge sharing culture, it is necessary to make visible the connection between knowledge sharing and practical business goals, respect the overall style of an organization, link knowledge sharing to existing held core values, make good use of and develop existing human networks, and last, hire employees who already has a tendency to share and support knowledge sharing.

Beside the recognized impact of organizational culture on the knowledge sharing practices of an organization, it is additionally the difference of culture between source and recipient that may in top of that raise a barrier to be considered in any knowledge transfer. An example illustrating how delicate is the transfer of knowledge across cultures is given by Lunnan, et al (2005) who describe the long and perilous transfer of a performance management best practice originating from the USA to different subsidiaries of a Norwegian multinational. This hindering impact of culture differences on knowledge transfer is broadly accepted and has drawn the attention of numerous scholars. For instance, Mowery et al.(1996) has found in his study on inter-firm knowledge transfer and strategic alliances that alliances of U.S. firms with non-U.S. firms resulted in significantly lower levels of knowledge transfer than what is usually found in alliances involving uniquely U.S. firms. The researchers suggested that among other factors, distance and cultural differences could explain largely the impediment in transferring knowledge. As another example, Bhagat (2002) has investigated the moderating

effect of cultural variations on the effectiveness of cross-border transfer of organizational knowledge. Four cultural patterns, namely horizontal collectivism, vertical collectivism, horizontal individualism, and vertical individualism, are suggested to have different moderating effects on the effectiveness of the transfer depending on the type of knowledge which is transferred. In a totally different perspective, Holden et al. (2004) highlight a collection of difficulties inherent to cross-cultural knowledge transfer by using an original but sound analogy to the act of translating and by introducing terms originating from the translation science.

To conclude, it can be said that, despite a unquestioned interest in knowledge properties, source and recipient's characteristics, or types of medium used, a large body of research focused on knowledge sharing and knowledge transfer has fruitfully steered its efforts toward the search for a better comprehension of the theoretical and practical underpinnings that can be found behind the complex concept of organizational culture in which a knowledge transfer takes place or, the difference of culture, in case of a cross-cultural knowledge transfer.

2.4.5. Knowledge Transfer: Conclusion

The previous section has suggested that organizational knowledge sharing is basically a two-phase process starting first with awareness and continuing then with knowledge transfer. The above has quickly reviewed the many literature tackling knowledge transfer issues. The term of "knowledge stickiness" was introduced and showed how certain characteristics of a knowledge-object facilitates or impedes the success of its transfer. Questions bearing on the influence of the knowledge sources' characteristics and knowledge recipients' characteristics naturally followed and preceded a discussion on the issues pertaining to the use of media, the canals through which knowledge is transferred. Last, a presentation of different perspectives characterizing different knowledge sharing cultures and investigating cross-cultural knowledge transfer issues concluded this review of literature on knowledge transfer.

This section has shown that the knowledge transfer phase of the knowledge sharing process is an important, complex, and intensively-investigated research topic. Furthermore, and most importantly, it highlights the limitation of scope of the above theories which constrain themselves to the transfer of a piece of knowledge from a source to a recipient. This limitation calls for a better consideration of what comes before the identification of such a transfer (Hansen, 2005), namely the awareness development stage, the phase in which sender and recipient acquire the awareness of a piece of knowledge which needs to be transferred from a certain source. A review of the different theories bearing on those issues is given immediately after.

2.5. KNOWLEDGE SHARING AND AWARENESS

In the previous sections, it was revealed that two broad stages constitute the knowledge sharing process: a first phase during which the awareness of a relevant piece of knowledge is developed by a receiver and a second phase during which the identified advantageous piece of knowledge is transferred from a knowledge source to the recipient. The section above presented a review of the literature bearing on the second phase of the knowledge sharing process, the knowledge transfer phase. As it was pointed out earlier, the first phase, often called “awareness development phase”, has been examined with far less diligence than the knowledge transfer phase despite its proven importance.

This section proposes to explore first the different disciplines in which the term of “awareness” appears as a critical element to consider and continues with a brief reference to the work performed around the concept of ignorance. To this follows a review of information seeking theories, knowledge sourcing, environment scanning studies, and research on serendipity. Last, a presentation of the overarching social network analysis perspective concludes this section.

2.5.1. Awareness, a critical antecedent of knowledge transfer

The concept of "awareness" as the variable intervening before any transfer of knowledge is not a term for which the definition has been widely publicized. However, its importance as part of the knowledge sharing process has been lately emphasized directly or indirectly by many scholars.

Hansen et al (2005) strongly advocate the need to investigate this area and point out that "while some studies have analyzed the transfer of knowledge from a point to another (eg. Gupta & Govindarajan 2000, Szulanski 1996, Zander & Kogut 1995), they have excluded the logically prior phase of searching for knowledge or have not empirically disentangled the two phases of search and transfer (Hansen 1999)". Beside, in the introduction to the "special issue on information technologies and knowledge management" of the MIS Quarterly, Sambamurthy and Subramani (2005) describe three important knowledge management problems worth to be investigated, namely, knowledge coordination, knowledge transfer and knowledge reuse. What they call "knowledge coordination" refers explicitly to the need of developing awareness among information seekers in order to enable knowledge sharing. The importance of having organization members be aware of "who knows what and who can be asked for help" is emphasized (ibid, pp.3). The authors claim that more research is "still needed to understand the social, cognitive, institutional, and technological processes through which the seekers of knowledge locate knowing entities" (ibid, pp. 3). Cross et al (2001) claim that the knowledge of "who knows what" is critical for effective knowledge sharing in an organization.

In the context of diffusion of innovation, Rogers (1995) suggests an innovation-decision process in which the first stage, called "knowledge", is the phase where an individual "is exposed to an innovation's existence and gains some understanding of it". It is only after the exposure to an innovation that an individual can go through the next stages, namely

persuasion, decision, implementation and confirmation (ibid, pp. 162). Rogers (1995) argues that, during the first exposure to the innovation's existence, an eventual future adopter of the innovation may get to know, to different degrees, three different types of knowledge; the *know-what*, which is called "awareness-knowledge" by the researcher, answers the question "what is the innovation?", the *know-how* called "how-to knowledge" answers the question "how does it work?" and is therefore necessary to use an innovation properly, and last the *know-why*, called "principles-knowledge", answers the question "why does it work?" and refers to the functioning principles underlying how the innovation works (ibid, pp. 166-167). Rogers argues that the three types of knowledge about an innovation can be brought to individuals through the use of change agents or mass media channels.

Whereas it is hard to find research addressing specifically the questions raised by the concept of awareness, various disciplines offer interesting perspectives that help to better understand, at least partially, how organization members come to be aware of what knowledge should be transferred from where/who to where/who.

2.5.2. Awareness and Ignorance

Before getting onto more specific theories relating to awareness, this short section takes a look at the old notion of "ignorance", a term closely related to the concept of "knowledge". Basically, their relationship is antonymy. Ignorance refers to the lack of knowledge on a particular subject. In our perspective, ignorance and awareness are intertwined. Indeed, it is often said that the awareness of one's ignorance plays an important role in the learning process. Different taxonomies of ignorance have been suggested. One of the most popular distinctions is about the difference between being aware of what we do not know (a conscious ignorance) versus not being aware of what we do not know (sometimes referred as "ignorance-squared" for it is the ignorance of his or her own ignorance). Kerwin (1993)

proposes a simple but enlightening cognitive map which introduces a meta-level of knowledge to name this kind of awareness (see Table 6).

	First level	**Second level**
Meta-level	Knows	Unknowns
Known (Aware of)	Meta-knowledge	Known ignorance
Unknown (Unaware of)	Tacit knowledge	Meta-ignorance

Table 6 - Adapted from Kerwin (1993)

The "ignorance-squared" or meta-ignorance is particular since it changes into "known ignorance" as soon as the individual discovers its existence.

Ignorance or low level of awareness can be costly for firms. Haldin-Herrgard (2000) claims for instance that one of the main difficulties inherent to the sharing of tacit knowledge is the ignorance by organization members of the knowledge that exists and resides in their organization. Tacit knowledge is hard to recognize, and without the awareness that a piece of knowledge exists somewhere, in reach, it will never be transferred and used. The title of this popular management book "If we knew what we know: the transfer of internal knowledge and best practices" (O'Dell et al, 1998) summarizes well the difficulty faced by companies willing to build the aware of their own knowledge and it gives a sense of the cost that results from that ignorance.

Johnson (1996) suggests that different levels of ignorance (that he himself defines as inversely proportional to the "awareness of things known to other in the organization") presents different costs and benefits. He argues that while many researchers have dwelled on the assumption that low ignorance (i.e. high awareness) is advantageous for individuals because it allows them to catch opportunities and solve problems before they appear, researchers and practitioners should also pay more attention to the benefits for individuals of high ignorance (i.e. low awareness) and to the costs of low ignorance (see Table 7). Promoting low awareness

within an organization can allow managers to “divide and conquer”, ease the control on employees (who do not know what is happening and then cannot argue with hierarchy), and decrease the information load (Johnson 1996). What is more, individuals themselves find some benefits by having “the comfort of denying the existence of problems that they would have to work to overcome” (ibid.).

Level of Ignorance	Costs	Benefits
High	Don’t confront problems Lack of coordination Lower integration Opportunities foregone	Comfort of denial Easier control More anomie / easier to manipulate Lower information processing costs
Low	Increased conflict Alienation More difficult to control Higher information processing cost	More likely to confront problems Greater coordination Higher integration Opportunities addressed

Table 7 - Costs and Benefits of Differing Levels of Ignorance (Source: Johnson 1996, pp. 96)

This perspective is original and provocative as it demonstrates that high level of ignorance, or in other words, low level of awareness, does not necessarily hinder business performance in every context and may even present some benefits in some of them. Additionally, it suggests that too much of a good thing may be bad. Indeed, it can be understood from the Johnson’s work that a balance between not enough awareness (that would harm performance because of missed opportunities, avoidance of problems, etc) and too much awareness (that would hurt as well because of high processing cost, increased conflict, etc) has to be found in each organization.

To comprehend better the way individual awareness intervenes in the knowledge sharing process, the next section offers an overview of the information seeking field whose main question is the investigation of the information search process.

2.5.3. Information Seeking

Before considering any transfer of knowledge, it is a necessary step to obtain the awareness of a relevant piece of knowledge. This awareness can be the fruit of a knowledge/information search and the decision to search is often triggered by the identification of a problem that needs solutions. The information seeking approach is often referred to as the problemistic search (Cyert & March, 1963).

To illustrate this perspective, the model of knowledge re-use of Majchrzak, et al (2004), presented earlier, exhibits a process in line with the information seeking view. In this particular framework, the knowledge re-use process is described as a succession of stages that starts with the refinement of a problem, continues with the decision to seek a solution, follows with the actual search for knowledge, the evaluation of alternative solutions, and concludes with a knowledge transfer stage. Still relating to knowledge re-use processes, another example of information seeking perspective is given in the Markus' work (2001). According to the researcher, the actual knowledge reuse stage consists of four different activities. It starts by *defining the search question*, follows by *searching for experts or expertise*, *selecting an appropriate expert or expertise*, and ends up by *applying the knowledge*. This perspective on knowledge reuse definitively takes an information seeking stance and lends additional support to the argument that information seeking and awareness are critical elements of the knowledge sharing process.

Summarizing several years of research in the information seeking field, Johnson (1996) identifies five recurrent and well-established findings. His first point is that individuals seek out information mainly based on its availability (rather than according to a credibility or authoritative criterion for instance). The second main finding is that organization members are often unaware of sources of information and do not know how to use them. The third argument is that individuals generally follow habitual patterns in their information seeking

process and that those patterns are often unsatisfactorily effective. Forth, it is found that face-to-face interpersonal communication is the preferred mode of communication for information seeking. Last, different types of individuals exist and the different persons use different sources of information. From this information seeking perspective, it is worth nothing that the second point is closely related to our research interest, namely “awareness”, and that it highlights the difficulties organization members have developing it.

To facilitate information seeking, Johnson (1996) suggests two approaches that occupy two different levels. The first approach is to “educate organizational members on the capabilities of information carriers” (ibid, pp.119) and concentrates on changing the individuals themselves. Training and skill development programs can be offered to employees to increase their familiarity with authoritative sources of information for instance. The second approach, at an environmental level, focus on “creating rich information fields” (ibid, pp. 121). It consists in making effort to better design the physical environment (e.g. office layout), better use information processing technologies, and improve data storage, data transport and data transformation within the company.

This brief overview of the information seeking literature seems to demonstrate that the ability of employees to find, swiftly and with minimal cost, important information or knowledge is a critical and harsh issue for companies. The process is complex and calls for disparate considerations. Johnson (1996) mentioned the importance of information sources. Unsurprisingly, a growing body of research has steered their focus toward this direction. The question of better understanding where organization members obtain their knowledge from has indeed received lately a great deal of attention.

2.5.4. Knowledge Sourcing

Contrasting with but related to the above view which focuses on facilitating the search of solutions to arising problems, the "knowledge sourcing" perspective is interested in the choice and pattern of use of some specific sources to acquire knowledge. Being aware of and using a certain collection of knowledge sources will have an impact on the knowledge sharing outcomes and on the way awareness is developed by organization members.

For instance, Soo, et al (2002) note that, in the consulting industry, it has been realized widely that the use of formal database subsystems comprises inherent inefficiencies, especially when it comes to transfers of tacit knowledge. Consequently, a popular choice has been to favor a "hunting and gathering" approach supported by highly developed personal networks in order to obtain knowledge and build awareness. The use of database subsystems as a primary information and knowledge source diminished sharply. This finding is certainly highly dependant on the context that is considered. However, this tendency of employees to privilege people over technology when selecting a knowledge source has been observed by various researchers. For instance, a study of Cross et al (2001) involving 40 managers from a consortium of American Fortune 500 companies and government organizations revealed that the reliance on people-type sources of knowledge was overwhelming compared to the use of PC archive, internet, or knowledge database (see Figure 14).

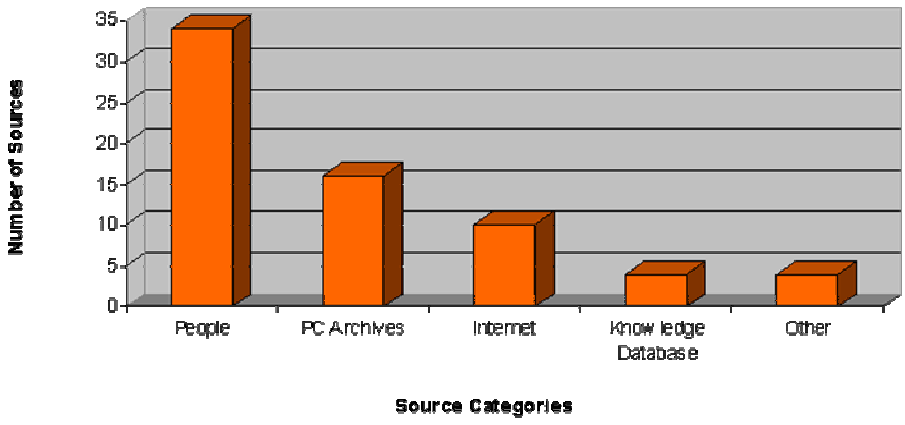


Figure 14 - Sources of important information by Cross, et al (2001)

Tackling knowledge sourcing issues in a different perspective, Almeida (1996) found for that multinationals in the U.S. semi-conductor industry tend to favor further local learning rather than the acquisition of knowledge residing overseas. In other words, the sources of knowledge they privilege are regional or national. Important implications bearing on the knowledge sharing process of this industry can be derived from this finding. O'Reilly (1982), interested in understanding better the impact of quality and accessibility of information on the use of information sources, has investigated the question of information sourcing among decision makers. His results indicates that contrary to the expectations one may have, the accessibility of an information source was the key predictor to its use and that the quality of the information residing in a particular source did not significantly matter in regard to its frequency of use.

In line with this study, and quite interestingly, Casciaro, et al (2005) states, not without humor, that the people in organization in need for assistance are more likely to refer to a congenial colleague (sometimes categorized as "lovable fool") rather than asking a more competent individual for help (especially if he or she is categorized "competent jerk"). At a first glance, this pattern may seem paradoxical. A large part of the solution simply bears on the social cost involved when asking for help. For instance, Lee (1997 and 2002) or Edmondson (1999) stress the importance of this matter and reminds that the fear employees have admitting an error or asking for help makes learning difficult and ineffective. Edmonson (1999) introduced the term of psychological safety and found it to be a good predictor of the learning behavior in work teams.

In this section, it has been seen that the different patterns that can be found in the use of knowledge sources spawn important implications that are worth considering before designing a knowledge management program. Also, it has shed lights on the stage coming before knowledge transfer in which organization members build their awareness of existing

knowledge based on the sources they know and use. Understanding how this happen is critical.

Leaving for now the emphasis on knowledge sources, the next section gets onto the issue of environment scanning.

2.5.5. Environment scanning

Research relating to environment scanning helpfully illustrates how organization members' behaviors affect the awareness development necessary to initiate advantageous knowledge transfers. Environment scanning can be referred to as the process through which individuals build and update their awareness of the external environment. This concept differs from the information seeking scenario in which organization members search a particular piece of knowledge that answers a certain problem.

In a study concerned with environment scanning, champion behavior, and project performance in the context of product innovation, Howell and Shea's results (2001) reveal that environment scanning activities through people do contribute to better project performance (mediated through champion behavior) whereas environment scanning through documents affects negatively champion behaviors and consequently projects performance. Similarly, Ancona and Caldwell (1992) focused their research on the relationship between organizational teams' activities and performance. The researchers found that *ambassadorial activities* (promoting the team with management, securing resources,…), *task-coordinator activities* (coordination, negotiation, feedback), and *scouting activities* (updating its information base, scanning for new ideas about technologies and markets) are the three patterns of activities which explains how teams interact with their external environment. Interestingly enough, and roughly speaking, while the two former patterns resulted at least partially in better performance at a given time, *scouting activities* were found to impede team

performance at all time. The researchers suggest that the poor performance of scouting teams may be due to a confusing effect stemming from the possible equivocality of the information gathered or may be explained by the mere lack of time available for *ambassadorial* and *task-coordinator* activities.

Contrasting with the above research that aims at verifying the relationship between environment scanning activities and business performance, it exits as well a large body of literature that investigates the question of how does the scanning occur and what are the processes it follows (e.g. Daft et al, 1988). Worthy of notice, the notion of "selective perception" has emerged as an important topic that finds its origins in the psychology discipline (Rogers, 2003). This term refers to the cognitive bias responsible for a distorted processing of information by individuals (Waller, et al, 1995). Every organization member exhibits a variable interest depending on the topic that is considered. As a consequence, while scanning their environment, individuals give a different cognitive attention that varies with each perceived piece of information. This has direct implications on the way awareness is built by individuals.

To summarize, while the positive impact of environment scanning on business performance did not find an unwavering support in all situations, it is nevertheless clear that environment scanning does influence the way awareness is built by individuals. The above research was helpful in highlighting the notions of costs and selective perception.

All the above sections shared a common view. Indeed, all the theories and models that have been reviewed at this point assumed that the potential receiver was somehow active building awareness, may it be through seeking knowledge, discovering new information sources, or scanning his or her environment. However, there are situations were the awareness is acquired without even a particular endeavor. The following consequently introduces the notion of serendipity.

2.5.6. Serendipity

Researchers have found that one way knowledge gets identified and transferred from an individual to another is just chance or serendipity. Two individuals meet at the coffee machine and realize while discussing informally that one could incidentally help the other with his or her knowledge. The awareness of an interesting piece of knowledge comes by chance from a serendipitous event. Contrary to the information seeking perspective where the awareness of a need triggers a knowledge seeking stage, in this case, it is the discovery of the existence of a piece of knowledge which leads to the awareness of a need. The question of what comes first between awareness of a need and awareness of a solution has been raised by Rogers (1995) in the context of diffusion of innovation. Taking the serendipitous perspective, the development of employees' awareness is something difficult to manage due to its nature. Most managers recognize the importance of places like cafeteria or breakfast room in which informal discussions and serendipitous events can take place. How to design a physical layout that would ensure the optimal sharing of ideas among research and development teams is an issue which has received a great deal of interest in literature (e.g. Allen 1977). On a different approach, social software applications designed to connect people according to their common interests have been developed and some firms implement those systems with the hope of increasing serendipitous events. For instance, Eagle (2004) proposes a social networking software installed on cell phones that uses bluetooth technology and informs organization members when a “compatible” colleague is close by.

The term of “slack search” have been introduced by Cyert and March (1963) to describe this peculiar kind of search that exhibits a slack object of study. Some research have shown that this approach do in some cases result in the discovery of superior practices that call for a transfer of knowledge and the closure of a performance gap (Rogers 1983, Zaltman 1973).

To put all the above into perspective, it can be said that the previous sections has shown different ways individual awareness can be built by organization members, with approaches ranging from information seeking to serendipitous events. The next section proposes to view those various processes in the light of the social network analysis field.

2.5.7. Social Network Analysis

With a more general scope, research focusing on social network has recently yielded very interesting insights on how knowledge is shared among individuals. Additionally, it has lent considerable support to the critical role played by awareness.

In a nutshell, the social network perspective views individuals as nodes of a network and the relationships among them are called ties. The term "social network analysis", also called SNA, refers to the set of analytic tools that are used to map the relationships among nodes. Social network analysis is a powerful instrument to visualize how networks operate. Cross, et al (2001, pp. 103) phrase it attractively saying that "social network analysis provides a rich and systematic means of assessing informal networks by mapping and analyzing relationships among people, teams, departments or even entire organization". SNA is today a mature technique and has been used by many disciplines. Krackhardt (1990) introduced the "kite structure" to illustrate different concepts relating to centrality (see Figure 15).

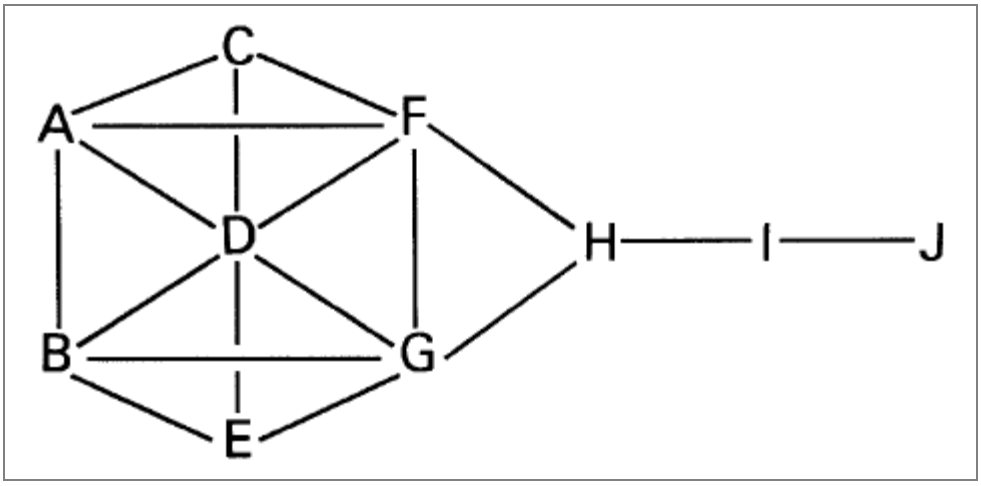


Figure 15 - The "kite" network (source: Krackhardt, 1990)

In the book "The Hidden Power of Social Networks: Understanding How Work Really Gets Done in Organizations", Cross (2004), a leading researcher in the SNA field, emphasizes the stunning differences that appear between organizational chart and actual social network (e.g. Cross et al, 2002; or Cross et al, 2001, see Figure 16). Boundary spanners, knowledge brokers, and peripheral roles emerge clearly from mappings.

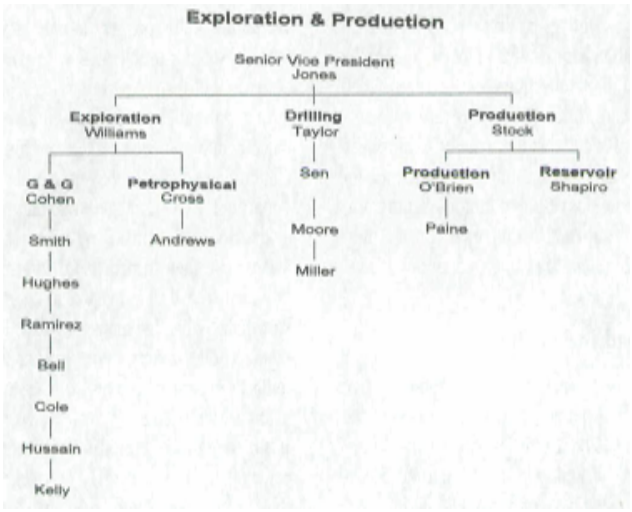
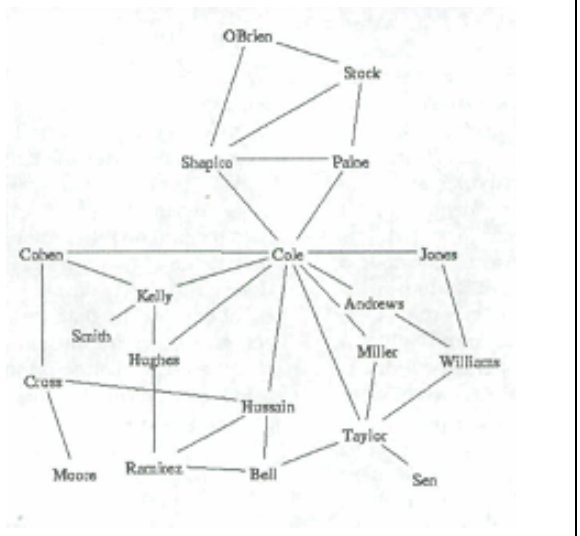
Formal Organizational Structure of Exploration and Production Division	Informal Organization Structure of Exploration and Production Division
	

Figure 16 – Example of Formal Vs. Informal Organizational Structure (Source: Cross, et al, 2001)

Often, the ties between nodes represent the amount of communication uncovered through a questionnaire given to every individual who belongs to an audited network. Sometimes, the frequency of communication is quantitatively recorded and analyzed thanks to sophisticated software programs able to monitor all email and phone communications between employees. Those kinds of studies frequently produce much appreciated insights directly usable by companies interested in finding communication bottlenecks in their organization or wishing to identify peripheral players who need particular attentions.

However, more interested in fostering the knowledge sharing process than in mapping communication flows, Cross, et al (2001) recommend that the assessment of communication levels between nodes is complemented with the assessment of four important characteristics

of every relationship (see Figure 17). The researchers argue that the analysis of the combined network (*Knowledge*, *Access*, *Engagement*, and *Safety*) reveals sharply how knowledge gets shared in an organization.

Four relational dimensions believed to impact knowledge sharing in social networks			
1. Knowledge	"Knowing what someone else knows (even if we are initially inaccurate and calibrate over time) is a precursor to seeking a specific person out when we are faced with a problem or opportunity. For other people to be options we must have at least some perception of their expertise."	**3. Engagement**	"People who are helpful in learning interactions actively think with the seeker and engage in problem solving. Rather than dump information, these people first understand the problem as *experienced by the seeker* and then shape their knowledge to the problem at hand."
2. Access	"However, knowing that someone else knows is only useful if you can get access to their thinking in a sufficient timely fashion. Access is heavily influenced by the closeness of one's relationship as well as physical proximity, organizational design and collaborative technology."	**4. Safety**	"Finally, those relationships that are safe are often more effective for learning purposes. Being able to admit a lack of knowledge or to diverge in a conversation often results in creativity and learning."

Figure 17 (Source: Cross et al, 2001, pp. 105)

One can notice that the relational dimension called *knowledge*, introduced by Cross et al, closely relates to the notion of *awareness* as defined earlier. Interestingly enough, Cross et al (2001) found it to be a critical element to consider for improving knowledge sharing in an organization.

Similarly, Hansen has shown a deep and persistent interest in the investigation of the knowledge sharing process, its phases and the relationships that can be found using SNA (Hansen, 1999; Hansen, 2002; Hansen et al, 2005). For instance, one of his studies (Hansen, 1999) demonstrates that weak ties among individuals of a network tend to make the search of a particular piece of knowledge more beneficial because knowledge redundancies among employees are fewer and that therefore, each network member may have a more unique relevant knowledge to offer in response to a certain question. The same study claims that weak ties, in the same time, lead to problems when it comes to the transfer of knowledge. Figure 18 summarizes those findings.

	TIE STRENGTH	
KNOWLEDGE	**Strong**	**Weak**
Noncodified, Dependent	Low search benefits, moderate transfer problems	Search benefits, severe transfer problems
Codified, Independent	Low search benefits, few transfer problems	Search benefits, few transfer problems

Figure 18 - Search and Transfer effect associated to four combinations of knowledge complexity and ties strength (Source: Hansen, 1999)

In a more recent study, Hansen (Hansen, 2002; Hansen et al, 2005) pursue the investigation bearing on the links between knowledge sharing stage and network characteristics by proposing an integrated framework. Three knowledge sharing phases are considered. First, the decision to seek a certain piece of knowledge has to be taken, then the search can actually begin, and last, once a relevant knowledge is located, its transfer concludes the process. The properties of the within-team network and inter-unit network are found to affect differently each of these stages.

The above has demonstrated that social network analysis is a useful and powerful tool not only to map information flows, but also and especially, to reveal knowledge sharing patterns and knowledge sharing issues. The work of Cross, et al, emphasized the importance of what could be related to our concept of awareness. The awareness of "who knows what" and the notion of access were suggested to be critical for the knowledge sharing process. Hansen (2005) highlighted the notion of knowledge sharing process in social networks and denounced the lack of research in the stages preceding transfer of knowledge.

2.5.8. Knowledge Sharing and Awareness: Conclusion

The concept of "awareness" stage has not received much attention from researchers. Or more exactly, there are many perspectives that do mention its importance and role in the knowledge sharing process but the term of awareness is often eluded, replaced by another term. More

importantly, in this fragmented landscape, there lacks an integrated view on its exact nature, the process through which it is built and on how it leads to effective knowledge transfer.

The following summarizes briefly this section on awareness. It has been seen that the concept of “ignorance” exhibits an antonymic relation with the idea of “knowledge” and that the awareness of one’s ignorance is a critical element to be considered in the context of individual learning. Going further, information seeking theories demonstrated the importance of problem identification and refinement in the knowledge sharing process. Extending the scope to knowledge sourcing issues, a review of different studies showed that the awareness of a certain collection of knowledge sources and the patterns of use of those sources played a significant role in the upstream stages of the sharing process. Considerations on environment scanning and performance followed and introduced the concept of “selective perception” known to affect the way awareness is built. Contrasting with those approaches, the serendipity perspective gave evidence that a certain awareness is sometimes acquired by mere chance and that, despite chance cannot be provoked deterministically, it can however be bolstered by a favorable environment or tools. Last, the social network analysis field brought an overarching view of the above and highlighted the vital but under-researched role of awareness in the knowledge sharing process.

This literature review section is near its end. However, at this point, the issue of comprehending better what concrete means managers have at their disposal to improve knowledge sharing, awareness development, and knowledge transfer in their organization remains an open question. One promising and pragmatic way to tackle this question is to look at the knowledge sharing practices and mechanisms that can be promoted in firms and investigate their impact on the different knowledge sharing stages.

2.6. KNOWLEDGE SHARING MECHANISMS

The previous sections have presented the current state of research on knowledge sharing, including the knowledge transfer stage in which a piece of knowledge gets transferred from a source to a recipient, and the awareness stage which comes before and in which a piece of knowledge is identified for an advantageous knowledge transfer. Last but not least, this section introduces the term of "knowledge sharing mechanism" as an important concept for both researchers and managers since they are the means by which members of an organization share their knowledge and get involved in any knowledge sharing process.

Once again, the exact definition of this term varies depending on the perspective taken. Boh (2005) views knowledge sharing mechanisms as a sub-set of organizational learning mechanisms. More precisely, knowledge sharing mechanisms are defined as "the formal and informal mechanisms for sharing, integrating, interpreting and applying the know-what, know-how, and know-why embedded in individuals and groups that is relevant to the performance of the organization and its members". She believes that the mechanism concept covers both the formal processes adopted by the organization and the informal practices that have been developed. Chai (2000, pp. 32) defines more synthetically a knowledge sharing mechanism as any "structured, management-supported practice that allows knowledge transfer between participating organization members".

With the aim of developing a more concrete understanding of what a knowledge sharing mechanism is and to see the context in which they are used within and across firms, the following subsection proposes to review a few examples of well-studied knowledge sharing mechanisms.

2.6.1. Examples of mechanisms

Considering that a knowledge sharing mechanism is an organizational practice that promotes and allows knowledge to be shared among its member, a simple mechanism one may think of is the use of "*transfers of people among organizational units*", also referred to as "*personal movement*" or "*personal mobility*" mechanism. This mechanism is a well known, important, and widely used mechanism that has been found to effectively foster knowledge sharing within or across organizations (Kane et al, 2005; Criscuolo, 2005). For instance, Paul Almeida has taken a deep interest in studying the effect of engineers mobility on inter-firm knowledge sharing and interestingly enough, results show that personal movement do explain at least partially how knowledge flows among organizations (Song et al, 2003; Rosenkopf and Almeida, 2003; Almeida and Kogut, 1999).

Another mechanism that has received considerable attention in the last few years is the use of "communities of practice". The term "community of practice" appeared in the early 1990's as knowledge management gained more and more popularity among top executives. Etienne Wenger, who promoted this concept, defines those communities as "groups of people informally bound together by shared expertise and passion for a joint enterprise" (Wenger and Snyder, 2000, pp. 139). The reason behind the popularity of this notion is that communities of practice have been found to be an important mechanism through which knowledge can be created and shared over traditional organizational structures (Wenger et al, 2000; Brown and Duguid, 1991). Closely related, the use of peer groups has proved its ability to yield impressive knowledge sharing performance when appropriately managed (e.g. Goold, 2005).

Leaving for now the people-orientation of the mechanisms described above, it has to be said that the development of new technologies has brought forth the use of numerous, sometime elaborate, and definitively new, knowledge sharing mechanisms. The introduction of the internet, intranet, and email technologies has unquestionably changed the way companies

communicate and share their knowledge. Davenport and Vey (2004) found in a study involving 500 U.S.-based information and technology users that as an average, more than 3 hours a day were spent on the use of technology to process work-related information and that more than 1.5 hours a day were devoted to e-mail. Eagle (2004) claims that two parallel paradigm shifts have helped companies improve communication among colleagues, and, we can assume, have facilitated knowledge sharing among employees. The first shift is the move from desktop to mobile computing. The second is the apparition of "social software" (e.g. collaboration software, social networking software,...) replacing or at least complementing traditional "individual softwares" (e.g. word processor). Knowledge portals are today widely used by organizations and many firms have been able to derive significant benefits from their use (Fernandes et al, 2004). For instance, Baalen et al (2005) have been able to demonstrate the positive influence of knowledge portals on the emergence of networks of practice under certain conditions.

In a recent article, Hoegl et al (2005) proposes synthetically a list of the most popular knowledge management methods. The methods identified prove in many cases to be very similar to what is called here knowledge sharing mechanism (see Figure 19).

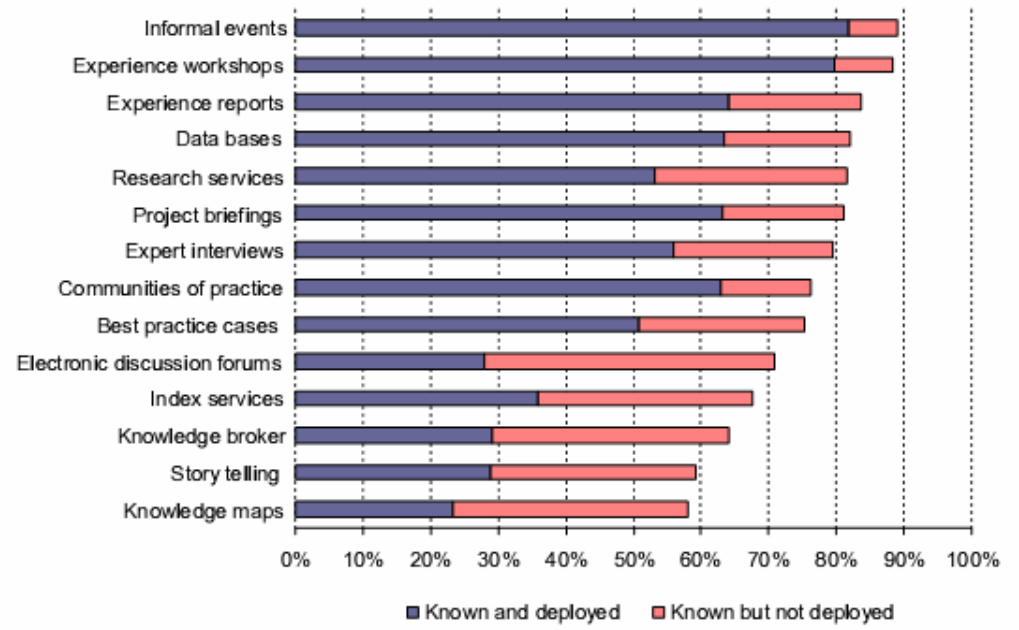


Figure 19 - Familiarity and deployment of Knowledge Management Methods in % of all responses (source: Hoegl, 2005)

The few examples of knowledge sharing mechanisms presented above give an idea of the diversity and complexity that lay behind the concept of mechanism. Stemming from this observation, different categorizations or characteristics have been proposed by researchers wishing to investigate the role played by knowledge sharing mechanisms in the knowledge sharing process and attempting to assess their influence on various dimensions of performance.

2.6.2. Knowledge sharing mechanism characteristics

As one can see from the above, there are many names and descriptions of mechanisms through which knowledge is known to be shared within and across organizations. Notwithstanding this area of the knowledge management literature has not received considerable attention, a few scholars have realized the need of a typology that would allow the creation and support of helpful knowledge sharing frameworks. This section offers the review of a few but important mechanism categorizations and encompasses the work of Appleyard (1996), Boh (2005), Hoegl and Schulze (2005), and Prencipe and Tell (2001).

While studying how knowledge flows between organizations, Appleyard (1996) proposed a classification of inter-firm knowledge sharing mechanisms arranged in terms of "access to" and "use of" the shared knowledge. More precisely, a first distinction is made between mechanisms in which access to knowledge occurs through "public" channels (patents, reverse engineering, newsletter, popular press, trade journals, and conference presentation) versus mechanisms in which access to knowledge occurs through "private" channels (email, telephone, face-to-face meetings, visit of other companies' plants, consortia or benchmarking studies). Secondly, mechanisms are classified according to the allowed use of the knowledge they carry. It separates mechanisms that tolerate nothing but a restricted use of knowledge versus those that allow unrestricted use (see Figure 20). Each of the four quadrants brought forth by those two distinctions is found to spawn different benefits and costs for the company wishing to use them.

Access to the Knowledge	Use of Knowledge: Restricted	Use of Knowledge: Unrestricted
Public	▪ Reviewing Patents ▪ Reverse Engineering Patented Technology	▪ Newsletter ▪ Popular Press ▪ Trade Journals ▪ Conferences
Private	▪ Visit Other Companies's Fab ▪ Consortium ▪ Benchmarking Studies	▪ Email ▪ Telephone ▪ Face-to-Face Meetings

Figure 20 - A Knowledge Sharing Mechanisms Categorization (source: Appleyard, 1996)

Boh (2005), noting the critical need firms have for effectively leveraging the knowledge resources that are distributed among their organization, proposes similarly a four-quadrant categorization. She argues that two knowledge sharing mechanism's dimensions are important to consider: the personalization-versus-codification dimension and the integration-versus-institutionalization dimension (see Table 8). The first dimension sets apart mechanisms in

which knowledge is shared through its codification into databases or documents versus mechanisms in which knowledge is shared directly through people-to-people interactions. The second dimension distinguishes mechanisms that facilitate knowledge sharing through integration processes that remain at an individual or group level by opposition to mechanisms that take advantage of processes institutionalized into routines or organizational structure. Firms often use knowledge sharing mechanisms of the four quadrants and it is suggested that the use of mechanisms with different characteristics breeds complementary benefits.

	Knowledge Sharing through Integration Processes between Individuals and Groups	**Knowledge Sharing through Processes Institutionalized in Routines/Structure**
Personalization	Informal networks and referral system Meetings Communication	Expert database Organization of support services Deployment
Codification	Informal sharing of documents	Community communication archives Repositories Standardized methodologies

Table 8 - Typology of Knowledge-Integrating Mechanisms (Source: Adapted from Boh, 2005)

Hoegl (2005) takes a different approach and uses the Nonaka's model described earlier to categorize what he calls "knowledge management methods" into four categories depending on whether the knowledge created through sharing is the result of four different types of activities: socialization, externalization, combination or internalization (see Figure 21). Highlighting the difficulty of assessing the return on investment on a particular mechanism, the researcher suggests that one way to circumvent the direct measurement of a mechanism's result is to focus on the activities that underpin them.

Socialization	**Externalization**
▪ Informal Events	▪ Experience Workshops ▪ Expert Interviews ▪ Experience Reports
Internalization	**Combination**
▪ Research Services	▪ Communities of Practice ▪ Project Briefings ▪ Best Practice Cases ▪ Knowledge Broker ▪ Databases

Figure 21 - An Hoegl's typology of "Knowledge Management Methods" (Source: Adapted from Hoegl, 2005)

Grounding their work in the organization learning line of research, and closely related to knowledge sharing, Prencipe and Tell (2001) argue that the mechanisms used for inter-project learning fall into three different categories associated to 3 different learning processes: experience accumulation, knowledge articulation, and knowledge codification. Taking into consideration different levels of analysis ranging from individual level to organizational level (see Table 9), 3 patterns of mechanisms' use are highlighted and the term of "explorer", "navigator" and "exploiter" are introduced to describe different learning landscapes.

	Learning processes		
Level of analysis	**Experience accumulation**	**Knowledge articulation**	**Knowledge codification**
Individual	On-the-job training Job rotation Specialization Re-use of knowledge experts	Figurative thinking "Thinking aloud" Scribbling notes	Diary Reporting system Individual systems design
Group/Project	Developed groupthink Person-to-person communication Informal encounters imitation	Brainstorming sessions Formal project reviews De-briefing meetings Ad-hoc meetings Lesson learnt and/or post-mortem meetings Intra-project correspondence	Project plan / audit Milestones / Deadlines Meeting minutes Case writing Project history files Intra-project lessons learnt database
Organizational	Informal organizational routines, rules and selection processes Departmentalization and specialization Communities of practice	Project manager camps Knowledge retreats Professional networks Knowledge facilitators and managers Inter-project correspondence Inter-project meeting	Drawings Process maps Project management process Lesson learnt database

Table 9 - A Typology based on Learning Processes (Source: Adapted from Prencipe and Tell, 2001)

All the above typologies give an interesting and fruitful insight into different aspects pertaining to knowledge sharing and its mechanisms. However, one of the limitations may be that no clear direction is given to managers who wish to know how to design and support an effective collection of knowledge sharing mechanisms. The link between knowledge sharing mechanism, its characteristics, and the requirements of the business environment is not investigated. Secondly, and in regard to the previous sections on knowledge sharing, transfer stage, and awareness stage, there is no specific reference pointing to the question of understanding how knowledge sharing mechanisms and the knowledge sharing process go along one with another. The Chai's framework (2003) presented below may give some clues that address satisfactorily the mentioned shortcomings.

2.6.3. Knowledge sharing mechanism selection framework

Knowing what knowledge sharing mechanism to use or support is a delicate and important question faced by both organization members and top managers. Basically, very little has been done in this area. In the communication field, a reference can be made to the media richness theory presented in section 2.4.3 because it provides a mature, albeit challenged, framework that provides a sound grounding on which individuals can better understand why certain media are more suitable for certain situations. Going further, it exists an abundant body of literature called "media selection theories" that specifically attempts to answer the questions of how should a medium be selected and of why some media work well while some other do not (e.g. Carlson and Davis, 1998).

Building upon this perspective and recognizing the lacking research on the topic mentioned above, Chai (2003) suggests a knowledge sharing selection framework that takes into account both the mechanisms' capacity for transferring different types of knowledge and the mechanisms' role in the different stages of the knowledge sharing process. The first finding is that different types of knowledge call for knowledge sharing mechanisms with different "richness" properties. Explicit knowledge may be easily shared thanks to the use of a "report" mechanism, but highly tacit and highly embedded knowledge will require a mechanism far more "rich" that, for instance, the transfer of trainees to an expert site (see Table 10).

Types of knowledge	Transfer mechanisms
Explicit (low tacitness, low embeddedness)	Reports, periodicals, standard operating procedures
Endemic (low tacitness, high embeddedness)	Best practice guidelines, periodicals, benchmarking, forums, international teams
Experiential (high tacitness, low embeddedness)	Expatriation (expert to recipient sites)
Existential (high tacitness, high embeddedness)	Overseas training (trainee to the expert site)

Table 10 - Types of Knowledge and Knowledge Sharing Mechanisms (Source: Adapted from Chai, 2003)

The second finding affirms that different knowledge sharing mechanisms see their effectiveness vary when considering the different stages of the knowledge sharing process. In line with the knowledge sharing perspective presented in some earlier sections, the knowledge sharing process is viewed as constituted of two main phases. First comes the "awareness" stage in which a recipient comes to know the existence of an advantageous piece of knowledge. Follows a "transfer" stage during which the identified relevant knowledge gets actually transferred from the sender to the recipient. Chai argues that whereas the "transfer" stage may require a mechanism with high richness, the preliminary stage "awareness" necessitates a mechanism with high reach (see Table 11).

	Awareness	**Transfer**
Knowledge Sharing Stage	Knowing "who's who", "what's going on", best-in-class (i.e. "what can be done")	Sending knowledge to receivers
Mechanisms	Newsletter/periodicals Manufacturing audits Boundary spanners Forums (meetings / internal conferences) International teams	Transfer of people Benchmarking International teams Forums Best-practice guidelines Periodicals

Table 11 - Knowledge Sharing Process and Knowledge Sharing Mechanisms (Source: Adapted from Chai, 2003)

"Rich" and "richness" are therefore critical characteristics of any knowledge sharing mechanism and should be considered with keen attention. Table 12 suggests a comparison of the two constructs.

Characteristics	**Reach**	**Richness**
Dimensions	High number of receivers Ability to overcome geographical barrier Ability to overcome temporal barrier Ability to overcome functional/departmental barrier	Ability to transfer a lot of information at one time Ability to transfer a variety of information of different nature at one time High interactivity between senders and receivers

Table 12 - Comparison of the "Reach" and "Richness" constructs (Source: Chai, 2003)

Viewing together the first hypothesis on the link between knowledge type and mechanism's "richness" and the second hypothesis on the link between knowledge sharing stage and mechanism's "reach" brings forth the synthesizing table below (see Table 13).

<table>
<tr><th rowspan="2">Types of Knowledge</th><th colspan="2">Knowledge Sharing Process</th></tr>
<tr><th>Awareness</th><th>Transfer</th></tr>
<tr><td>Explicit</td><td rowspan="4">Boundary spanners
Forum (meetings/international conferences)
Manufacturing audits
International teams
Periodicals</td><td>Reports, periodicals</td></tr>
<tr><td>Endemic</td><td>Best practice guidelines, periodicals, benchmarking visits, forums, international teams</td></tr>
<tr><td>Experiential</td><td>Expatriation (expert to recipient site)</td></tr>
<tr><td>Existential</td><td>Overseas training (trainee to expert site)</td></tr>
</table>

Table 13 - A Knowledge Sharing Mechanism Selection Framework (Source: Chai, 2003)

This framework not only constitutes a pragmatic tool to help managers design and support effective sets of knowledge sharing mechanisms inside organizations but, through the introduction of the "reach" / "richness" constructs, it also shed lights on the underlying characteristic-matching that underpins the various degrees of effectiveness shown by the use of knowledge sharing mechanisms in different contexts.

2.6.4. Knowledge Sharing Mechanisms: Conclusion

In this section, it has been seen that knowledge sharing mechanisms play an important role in the knowledge sharing process since they are the means through which knowledge get shared within and across organizations. One can easily observe that many mechanisms are used in every firm and that a myriad of names have emerged to describe numerous and disparate practices. "Encouraged mobility", "communities of practice", "knowledge databases", or "corporate portals" are terms heard in most large organizations today. The need for a typology that highlights a few important characteristics pertaining to knowledge sharing mechanisms has been recognized by scholars. Several frameworks have been suggested. For instance, the

model of Boh (2005) distinguishes the mechanisms based on codification versus those calling upon a personification approach. In our view, one of the main shortcomings of the knowledge sharing mechanism frameworks encountered in literature is that they do not give a satisfactory answer to the question of knowing how and why a particular mechanism should be selected to answer the requirement of a certain context. Furthermore, most frameworks do not relate this question to the knowledge sharing process-perspective presented earlier. The Chai's framework (2003) constitutes a first and important step toward this direction and offers a founding on which further work can be pursued. Indeed, although the link between knowledge sharing mechanisms and the knowledge transfer stage has been extensively investigated (recall section 2.4), very little is known of the "awareness" stage, first phase of the knowledge sharing process, and of its relationship with the different knowledge sharing mechanism characteristics.

2.7. RESEARCH QUESTIONS

This chapter has reviewed in a fairly extensive manner the voluminous and complex body of literature that relates more or less closely to knowledge issues, the knowledge sharing process, the notion of knowledge transfer and awareness, and last but not least, the matters pertaining to knowledge sharing mechanisms. This review has brought to light numerous valuable contributions that, when put together, constitute a sound grounding on which knowledge management practitioners and scholars can depend on for various issues. In the same time, this review of extant literature has also revealed shortcomings and a lack of integrated view, particularly when it comes to understand the awareness phase of the knowledge sharing process and its relationship with the knowledge sharing mechanisms that are used within and across firms. Consequently, this section proposes, first, to summarize the contributions and

limitations uncovered in the earlier sections. Then, it derives from this summary a set of answered research questions that appear worth investigating.

2.7.1. Summary of contributions and limitations of extant literature

Concerned with knowledge management, the knowledge sharing process, and knowledge sharing mechanisms, this chapter commenced with the preliminary question of defining the notion of "knowledge". This seemingly simple question brought us more than two thousand years ago to a seminal dialogue written by Plato. Despite the age of this raging debate, it appeared that to this day, no irrefutable answer has emerged. An entire branch of philosophy called "epistemology" is dedicated to the problem of defining knowledge. Various paradigms were developed but none of them has gained unanimity. Instead of being blocked by this unsolved issue, modern management scholars have gone round the question. They have suggested numerous workable typologies and knowledge characteristics that fruitfully fit the perspective they take. In this regard, the most famous categorization is unquestionably the distinction introduced by Polanyi (1966) between tacit and explicit knowledge. It is highly probable that the reason underpinning such a recent and active interest in defining knowledge is due to the realization in the 1990's that the industrial age had been buried under the trumpeted advent of the information age and of the knowledge economy (Drucker, 1993). Knowledge is revealed as the most important resource of firms (Grant, 1996) and the knowledge-based view of the firm claims that "the creation and utilization of knowledge is the 'raison d'etre' of firms" (Reinmoeller 2004). Those perspectives gave birth to numerous knowledge management frameworks comprehending different mixes of technological and management concerns (e.g. Hedlund, 1994; Hansen et al, 1999; Earl 2001; Zack, 1999). A widely acknowledged view of the knowledge management field makes the clear distinction between knowledge creation issues and knowledge sharing issues (e.g. Markus, 2001; Zack, 1999).

The following section proposes to dig further into the knowledge sharing portion of the knowledge management discipline and aims at identifying the processes through which knowledge is shared within organizations. As an introduction, the Shannon and Weaver's model of communication process (1949) acquainted us with a terminology that got transposed to the knowledge sharing literature. Then, a review of the diffusion of innovation's processes with an emphasis on the work of Rogers (1995) preceded an investigation of a few famous processes encountered in the organizational learning literature. Followed a presentation of the seminal Nonaka and Takeuchi's model of knowledge conversion process (1995) and an overview of the knowledge re-use process perspective. To conclude, a section focused on the review of existing knowledge sharing frameworks revealed that knowledge sharing can be roughly viewed as a process comprehending two important stages (e.g. Hansen, 2005; Chai, 2003; Szulanski, 2000; Rogers, 1995). The "awareness" stage comes first and refers to the phase during which an eventual recipient comes to know about a relevant knowledge. Then, the "transfer" stage succeeds and describes the phase during which the identified piece of knowledge gets transferred from the source to the recipient. The next two main sections examine respectively the knowledge "transfer" stage on the first hand, and the "awareness" stage on a second hand.

A look into the literature that pertains to the knowledge "transfer" stage demonstrates the keen interest that has been allocated to this subject. It was found that, contrary to what intuition may suggest, knowledge does not flow easily within organizations. Szulanski (1996) coined the term of knowledge "stickiness" to report how difficult the transfer of a certain piece of knowledge may prove to be. Several antecedents of knowledge stickiness were advanced (e.g. Szulanski, 2000; Gupta et al, 2000; Mowery et al, 1996). Also, it was shown that differences of characteristics between various media do affect the effectiveness of knowledge transfers (e.g. media-richness theory with Gupta et al, 2000; Daft and Lengel, 1984, 1986; Vickery, 2004). Last but not least, the firm's knowledge sharing culture and the difference of culture

between sender and recipient were both found to influence the way knowledge gets transferred within an organization (e.g. Reid, 2003; Connelly et al, 2002; Lunnan et al, 2005). The review of these diverse and well-investigated perspectives brought to light an important limitation. Most of the above perspectives refrain from considering even superficially the stage that precedes knowledge transfer, assuming that the identification of potentially interesting knowledge transfers does not raise any particular issues (Hansen, 2005). The next section demonstrates that the "awareness" phase is far from being unproblematic and that, despite its importance in the knowledge sharing process, it has received little consideration from modern scholars.

Indeed, the concept of "awareness" did not get widely publicized in the past but several recent research have lately reminded, directly or not, its critical role in the knowledge sharing process (e.g. Sambamurthy et al, 2005; Hansen, 2005; Cross et al, 2001). Still, research on this area is surprisingly limited and it exhibits today a fragmented landscape. Introducing this section on "awareness", the antonymic notion of *ignorance* in organization is preliminarily discussed. It then gives way to a brief presentation of information seeking theories, a field concerned with the process through which the recognition of a problem precedes the search for and the finding of a solution. This view on awareness development leads fairly naturally to the knowledge sourcing perspective that highlights patterns of knowledge source use. Not far from information seeking and knowledge sourcing, research in environment scanning shed lights on the process and outcomes of "knowledge scouting" activities. Contrasting with those perspectives in which organization members more or less actively build the awareness necessary to initiate knowledge transfers, the serendipity view demonstrates that awareness can also be developed just by chance. Last, the social network analysis discipline provides an overarching framework that offers a novel and quantitative way to follow the awareness development process. This section on "awareness" stresses the importance of better

comprehending the stage that precedes knowledge transfer and makes clear the striking need for an integrated view on the process through which awareness is developed by individuals.

This literature review would not be complete without an examination of the role played by knowledge sharing mechanisms in regard to the development of awareness and the transfer of knowledge. They exist in many forms under various names and comprise for instance “engineer mobility”, “community of practice”, “knowledge database” or “corporate portal”,… Researchers have attempted to identify some important characteristics. Several typologies were suggested (e.g. Boh, 2005; Hoegl et al, 2005; Prencipe and Tell, 2001; Appleyard, 1996). Still, none of the theories and frameworks that emerged do address satisfactorily the question of understanding how executives should choose a certain set of mechanisms and why those sets would prove effective in a certain context. Furthermore, the link between mechanisms and the knowledge sharing process viewed as an awareness stage succeeded by a transfer stage has not been explored yet.

This extensive review of the contributions and limitations of extant literature naturally brings forth a set of questions that appear unexplored and in the same time critical to answer.

2.7.2. Formulating the Research Questions

This review of existing literature has examined synthetically the numerous contributions that stem from the extensive research conducted in the knowledge management and knowledge sharing field. In the same time, it revealed limitations in the area of “awareness development”, first stage of the knowledge sharing process and in issues that relate to its relationship with the characteristics of knowledge sharing mechanisms. The summary of contributions and limitations above is therefore useful in refining precisely a set of questions that, despite their importance, have received very little attention.

The questions this research investigates are formulated hereafter:

- What is the concept of “awareness”?
- How is awareness developed?
- What are the mechanisms that facilitate the development of awareness?

2.8. CONCLUSION

This chapter reviewed the rich and disparate body of literature pertaining to knowledge sharing. It started by observing the loose and delicate definition of knowledge and the recognition of its critical importance for firms in the today’s highly competitive economy. Knowledge sharing was revealed as a major and well-investigated field of the knowledge management discipline. However, notwithstanding the diligence with which the knowledge transfer stage has been researched, it was found that the “awareness” stage, upstream stage in the knowledge sharing process, had been neglected by scholars despite its critical role. Even though contributions bearing on this topic were found in a variety of disciplines, they proved to be constrained by the view researchers endorsed and exhibited a lack an integrated perspective that would include considerations of knowledge sharing process and knowledge sharing mechanisms.

3. Research Methodology

This chapter aims at describing and justifying the research methodology that was chosen in regard to the research objectives presented in the previous chapter.

3.1. Theoretical foundation and method selection

3.1.1. The positivist and interpretivist paradigm

Any research has somehow the final purpose of adding new knowledge to an existing body of knowledge either by proposing new theories either by combining, confirming or refuting existing theories. The relationship between the researcher and the knowledge he or she aims at developing is a critical issue of the research design stage. Philosophers have been investigating the question for decades and the answers that came out are numerous and disparate. However, if we take a perspective pragmatically focused on research methodology, two research paradigms have emerged, each one underpinned by a different ontological and epistemological position.

Ontology is the most fundamental branch of metaphysics and is concerned with the *study of being* or *existence*. It has strong implications on the way we view the world and on our understanding of reality. *Epistemology* is the branch of philosophy which is concerned with the definition of knowledge and what we perceive as truth. Many schools of thought can be distinguished, each of them claiming a different perspective.

As far as a researcher is concerned, and broadly speaking, all those ontological/epistemological positions can be categorized according to two research paradigms; positivism and interpretivism (see Table 14).

Tradition	Positivism and Post-positivism	Interpretive Research
Assumptions about reality	Realism: Objective reality that can be understood by mirror of science: definitive/probabilistic	Relativism: Local intersubjective realities composed from subjective and objective meanings: represented with concepts of actors
Goal	Discover truth	Describe meanings, understanding
Tasks	Undertake explanation and control of variables: discern verified hypotheses or nonfalsified hypotheses	Produce description of member's meanings and definitions of situation: understand reality construction
Unit of analysis	Variable	Verbal or nonverbal action
Method focus	Uncover facts, compare these to hypotheses or propositions	Recover and understand situated meanings, systematic divergences in meaning

Table 14 - Research traditions (Source: adapted from Gephart 2004)

Endorsing one or the other paradigm has serious implications for the research methodology to be chosen. To overcome the limitations of choosing a unique paradigm, some management researchers have adopted a middle-ground by mixing "traditional" methods from the two paradigms (Easterby-Smith et all, 2002). This research is more concerned with the development of an understanding, defining concepts though the collection of a rich set of data, giving importance to the context, trying to find different views of a same phenomenon, choosing carefully a specific sample and investing it as in-depth as it is necessary. The interpretivist perspective is therefore the one we will most likely lean toward.

Following the interpretivist paradigm, the exact choice of a methodology was based in addition on the study of the nature of the research questions.

3.1.2. Research Strategies and Nature of the Research Questions

This research aims at developing a further understanding of the stage that comes before any transfer of knowledge. In other words, the main objectives are to understand how the awareness, required to initiate any transfer of knowledge, is developed by individuals, how firms design and support certain knowledge sharing mechanisms that foster awareness development, and why some of those mechanisms actually yield great results when some

others do not. The main research question is of a how's form. Yin (1994) suggests that the choice of research methodology should be made based on the nature of the research questions.

Method	Form of research question	Requires control over behavioral events	Focuses on contemporary events
Experiment	How, why	Yes	Yes
Survey	Who, what, where, how many, how much	No	Yes
Archival analysis	Who, what, where, how many, how much	No	Yes/No
History	How, why	No	No
Case study	How, why	No	Yes

Table 15 - Research strategies (Source: Yin 2003)

According to the above table, the nature of our research questions pushes forward three candidates regarding our choice of methodology; Experiment, History or Case Study. By definition, knowledge sharing in a bottom-up fashion is a difficult object to control. What's more, the development of awareness is a complex issue in which the exact antecedent variables are still to be researched. Experiment is therefore a method which will be put aside without any long debate for this research and History and Case Study would appear as the privileged choice of methodology.

Another view on the choice of methodology is the study of the research type. As it is argued in Chapter 2, there is a lack of clear and integrated theories describing the issues that relate to the development and management of individual awareness. The lack of theories suggests that this research will aim at contributing to the development of new theories, constructs or frameworks (Eisenhardt 1989, Gill and Johnson 1991). In this context, an optimal strategy would be more "inductive and qualitative than deductive and formal" (Adler 1989, p.93). Also, the need to integrate a fragmented and disciplinary-confined field of research calls for a holistic approach supported by the flexible use of a set of multiple data sources.

In summary, the nature of the research questions, the objectives of the research itself, the lack of theories and the fragmentation in disciplinary-confined theories in the field all call for the use of the case study methodology.

3.2. RESEARCH DESIGN AND IMPLEMENTATION

Considering the philosophical stance we adopted and the nature of the research objectives, we chose to develop theory using a case study methodology. There are myriads of ways to design a case study research by combining the numerous techniques and methods available (Eisenhardt 1989). The pitfalls that loom on the researcher conducting a case study research are various (Miles 1979, Yin 1981). Many scholars in organizational research fail to satisfactorily use or present explicit analytical methods (Gephart 2004).

Viewing case study as a research strategy (Yin 2003), this research follows the case study research roadmap proposed by Eisenhardt (1989) which integrates and synthesizes the previous and abundant work on qualitative methods (see Table 16).

In this section is presented first the “objects of study” or “unit of analysis” that have been identified in the preliminary part of the research (“getting started” stage). Follows a description of the logic behind the case selection. Last, the data collection techniques that have been chosen are discussed as well as the data analysis techniques. The next section will tackle the quality of our research design and implementation.

Step	Activity	Reasons
Getting started	Definition of research questions Possibly a priori constructs Neither theory nor hypotheses	Focuses efforts Provide better grounding of construct measure Retains theoretical flexibility
Selecting cases	Specified population Theoretical, not random sampling	Constrains extraneous variation and sharpens external validity Focuses efforts on theoretical useful cases
Crafting instruments and protocols	Multiple data collection methods Qualitative data and quantitative data combined Multiple investigators	Strengthens grounding of theory by triangulation of evidence Synergistic view of evidence Foster divergent perspectives and strengthens grounding
Entering the field	Overlap data collection and analysis including field notes Flexible and opportunistic data collection methods	Speeds analyses and reveals helpful adjustments to data collection Allows investigators to take advantage of emergent themes and unique case features
Analyzing data	Within-case analysis Cross-case pattern search using divergent techniques	Gains familiarity with data and preliminary theory generation Forces investigators to look beyond impressions and see evidence through multiple lenses
Shaping hypotheses	Interactive tabulation of evidence for each construct Replication, not sampling, logic across cases Search evidence for "why" behind relationships	Sharpen construct definition, validity and measurability Confirms, extends, and sharpens theory Builds internal validity
Enfolding literature	Comparison with conflicting literature Comparison with similar literature	Builds internal validity, raises theoretical level and sharpens construct definitions Sharpens generalizability, improves construct definition, and raises theoretical level
Reaching closure	Theoretical saturation when possible	Ends process when marginal improvement becomes small

Table 16 - Process of building theory from case study research (Source: Adapted from Eisenhardt (1989)

3.2.1. Research questions and unit of analysis

From the literature review were identified several promising and unanswered questions that called for a case-study-type research. Before even reflecting on selecting cases and considering the various sampling techniques, it is recommended to focus and bound the collection of data in the upstream stages of the research (Miles et al 1994). The question "what my case is?" and "Where my case leaves off?" are delicate issues to be addressed by any qualitative researcher (ibid, pp. 25). Miles (1994 et al pp.25) defines a *case* as a "phenomenon of some sort occurring in a bounded context" and claims that the case, the "heart" and focus of the study, is also the unit of analysis of a case study research. It draws the boundary for data collection. Yin (1994) stresses that the unit of analysis definition should be closely based on the research questions.

Our research questions are listed below:

- What is the concept of awareness?
- How is awareness developed?
- What are the mechanisms that facilitate the development of awareness?

The 2x2 matrix of Yin (2003) distinguishes four basic types of case study design.

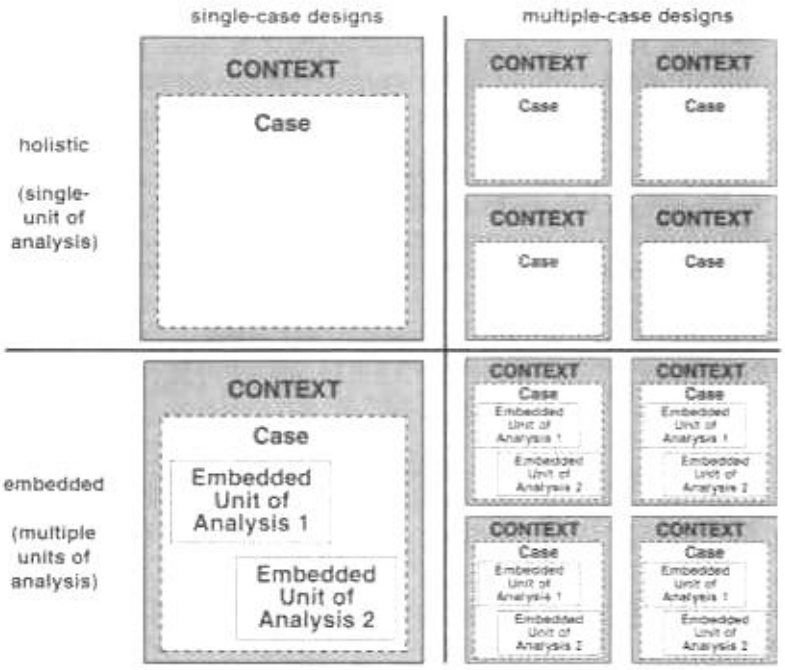


Figure 22 - Basic types of design for case studies (Source: Yin 2003)

In our case, the research questions above call for an embedded design. Indeed, the third question suggests that we take the *companies* in which we conduct the study as master cases. Then as a sub-unit of the master case, three types of sub-cases are considered. First, the first and second research questions are mainly concerned with the way individuals develop their awareness and on the link between awareness and knowledge sharing. Therefore, relating to the first and second question, "**bottom-up knowledge sharing events**" and "**individuals**" are chosen as appropriate units of analysis. Secondly, the third question is focused on "**knowledge sharing mechanisms**", on their properties and effects on knowledge sharing and awareness. Hence, knowledge mechanisms will be included as sub-unit of analysis.

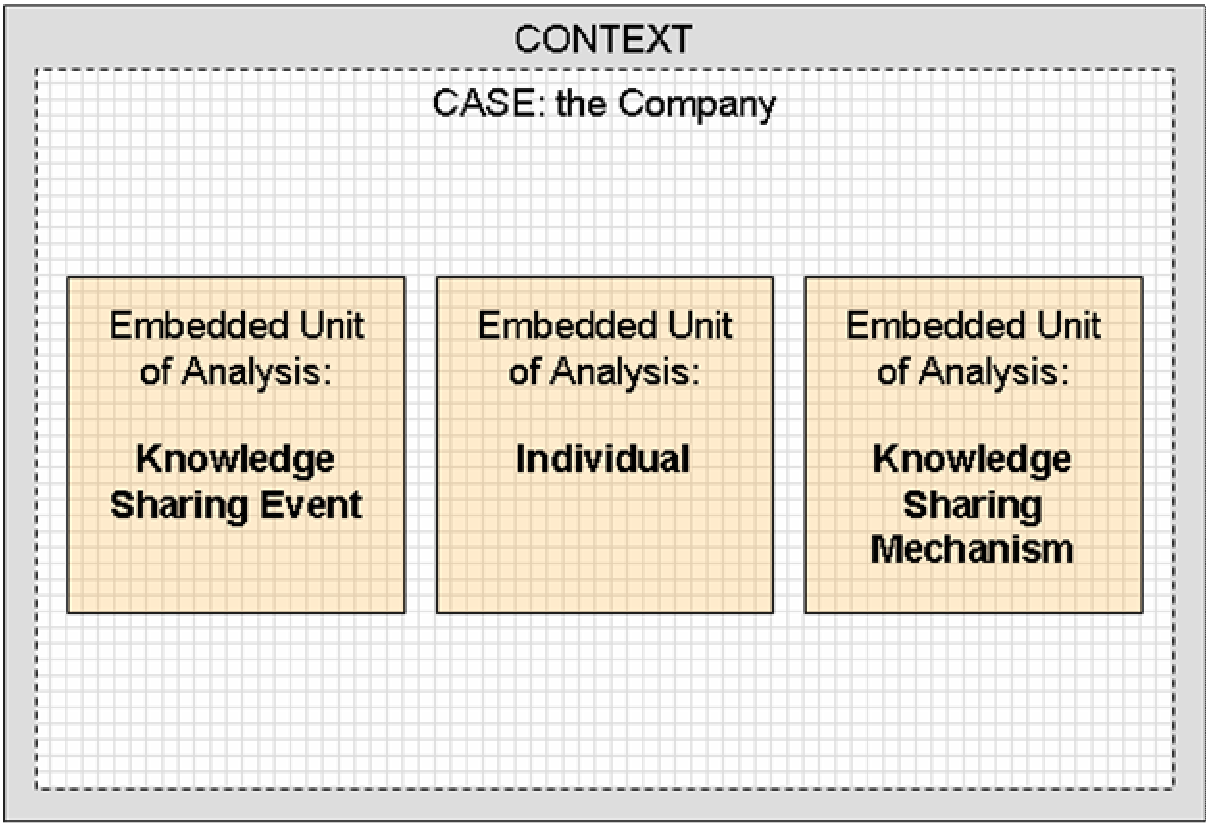


Figure 23 – The embedded Single-Case Design of the Research

One may argue that the units of analysis taken above may partially overlap on some aspects. The logic defended in this research is that the three sub-units of analysis, first of all, are well bounded and do not suffer ill-defined issues, and that, secondly, they allow a more targeted approach leading to focused results that answer the research questions.

3.2.2. Sampling strategy: selection of the cases

The sampling strategy will have an important impact on the validity and generalizability of the research findings. Whereas quantitative research privileges probability sampling in which the sample has to reflect the population as closely as possible, case study research does not seek and can rarely obtain large samples' size (Miles et al, 1994). Instead, case research commonly uses *selective sampling* that can be assimilated to *purposeful sampling* (Coyne et al 1997; Voss et al 2002; Yin 2004). In a nutshell, this sampling strategy serves the purpose of advancing the researcher in his or her research by guiding the case selection progressively and

according to some specific criteria. As Schatzman & Strauss (1973 pp. 39) put it, selective sampling is a practical necessity "shaped by the time the researcher has available to him, by his framework, by his starting and developing interests, and by any restrictions placed upon his observations by his hosts". King et al (1994) claim that selective sampling significantly improves the efficiency of qualitative research.

Selective sampling is a generic term and opens the way to a bunch of categories (see Table 17 below).

Patton (1990) **All sampling is purposeful — 15 strategies**	extreme or deviant case sampling
	intensity sampling
	maximum variation sampling
	Homogeneous samples
	typical case sampling
	stratified purposeful sampling
	critical case sampling
	snowball or chain sampling
	criterion sampling
	Theory-based or operational construct sampling
	confirming and disconfirming cases
	opportunistic sampling
	purposeful random sampling;
	sampling politically important cases
	convenience sampling

Strauss & Corbin (1990) **Theoretical sampling— three stages**	open sampling
	relational and variational sampling
	discriminate sampling
Morse (1991) **Four types:**	purposeful sample
	nominated sample
	volunteer sample
	total population sample
Sandelowski et al. (1992)	Selective sampling
	theoretical sampling
Sandelowski (1995) **All sampling is purposeful — three kinds**	maximum variation
	phenomenal variation
	theoretical variation

Table 17 - Various examples of qualitative sampling (Adapted from Coyne 1997)

Selection of the case, i.e. selection of the company

Regarding the choice of a number for and the selection of the master cases (choice of the company, "master" by opposition to the sub-unit of analysis), it was decided to limit the number of cases to one unique representative case in which all the sub-units of analysis described above will be extracted from. Two main reasons make explicit the rationale supporting this decision.

First of all, our focus lays mostly on knowledge sharing events and knowledge sharing mechanisms and does not encompasses cross-firm performance comparisons. Following the Voss et al (2002, pp.201) statement that "for a given set of available resources, the fewer the case studies, the greater the opportunity for depth of observation", it appeared that the benefit of collecting more data and insights on the actual focus of the research was likely to counterbalance the loss of generalizability and additional bias risks due to the consideration of a unique case study.

Secondly, the *representative* or *typical* case rationale for a single case, as stated by Yin (2003) is invoked. Indeed, it is assumed that whereas knowledge sharing practices may greatly differ from a firm to another, the development of awareness by individuals and the relationship between its development and the characteristics of knowledge sharing mechanisms should not vary considerably for companies reasonably in the scope of our research.

Therefore, the choice of the company was made based on a criteria and convenience logic.

The core interest of the study is about knowledge sharing and knowledge sharing mechanisms with a special focus on the concept of awareness. In order to find sufficient data relating to the sub-unit of analysis (knowledge sharing events, individuals, knowledge sharing mechanisms), and due to the exploratory nature of the research, the selection criteria were established as described below.

Knowledge is an important resource of the company: the company in which the study is conducted should demonstrate an interest in knowledge-related issues. Indeed, it is assumed that, to a certain extent, knowledge-based companies may place more efforts in knowledge management practices and may offer richer data and cases on the issues studied in this research.

Business operations are distributed: Our research questions are concerned with bottom-up knowledge sharing and, individual awareness, the piece of knowledge needed by organization members to initiate knowledge transfers with their peers. It is thought that firms that have distributed operations are more likely to experience difficulties in sharing knowledge than companies operating on a unique site and that awareness may appear as a critical antecedent of effective knowledge sharing in a multi-site configuration.

The headcount in the organizational structure studied is reasonably high enough: One more time, since the sub-unit of analysis includes knowledge sharing events and knowledge sharing practices, it is assumed that a minimum number of organization members is necessary in order to offer interesting, rich, and representative cases of knowledge sharing issues. Small structures may not bring forth clear-cut knowledge sharing events neither present representative knowledge sharing practices.

The underpinnings behind the three criteria given above is the search of a case that can offer the best sub-units of analysis, namely rich and numerous cases of knowledge sharing events, several cases of individuals involved in knowledge sharing issues, and a good variety and representativity of knowledge sharing practices.

The second element that came into consideration in the sampling strategy was convenience, mostly convenience of access. Indeed, selecting a company that follows perfectly the criteria above would be of no use if no access were granted to its organization members and management. Gummeson (1993), for instance, emphasized the importance of access issues

long ago. Taping into the personal and professional network of the researcher, a research-project proposal that exposed the research objectives/requirements, and emphasized the mutual benefits to expect, has been tentatively suggested to different individuals. A kind, privileged and enthusiastic support was to be received in response from the French senior process manager of one of the largest PABX divisions of the FRANCE TELECOM Group. Acknowledging that knowledge sharing was a key necessity for the division he was working in, the contacted senior manager agreed on acting as a prime contact (Voss et al, 2002), a gatekeeper, giving access to various managers and employees of his division, in exchange of a written feedback that would expose a "fresh academic perspective" on the encountered knowledge sharing issues.

FRANCE TELECOM Group is one of the world's leading telecommunications operators and serves more that 120 million clients on the five continents. The operations in the division we had an access to involve nearly 400 employees dedicated to PABX activities, from sales to installation and maintenance. With a turnover over 60 millions euros per year, the division counts 10 sites, including the headquarters and nine installation/maintenance centers. More details on the department and operations of the division studied will be given in the next section. FRANCE TELECOM PABX was a case fulfilling greatly the requirements expressed in the list of criteria above and offered a more than satisfactory access for the need of this research.

Sampling strategies for the sub-units of analysis

The previous section described the sampling strategy used to select a "master" case which is in our context, the company in which the study was conducted. In order to methodologically contribute to theory building and to answer properly the research questions, a sampling strategy has also been implemented at the sub-unit level.

Basically, this research employs an embedded single-case design. The sub-units of analysis that need to be sampled are *knowledge sharing events*, *individuals involved in knowledge sharing activities*, and *knowledge sharing practices*. A sampling strategy is presented briefly below.

Cases of *Knowledge sharing events* will be selected using an **opportunistic and criteria sampling approach** (Miles et al 1993). The selected cases will be required to offer a complete picture of knowledge sharing from the awareness of a possible knowledge transfer to the transfer and use of the knowledge itself. Also, the cases will have to be events of knowledge sharing where the identification of the knowledge to be transferred has been made by the knowledge user itself (called "bottom-up knowledge sharing") rather than the cases where knowledge transfer is initiated by top-management. Because of the serendipitous nature of the event, retrospective cases will be considered. This criterion aims at selecting cases that give a deeper insight on the way awareness is developed by organization members themselves.

The selection of cases describing *individuals involved in knowledge sharing activities* follows an **extreme or deviant case sampling strategy** (Patton 2002). Instead of selecting average cases, the deliberate decision to select extreme cases is hoped to offer an artificially-sharp view of the antecedents that affect the outcome of a situation. In our research, the cases of individuals involved in knowledge sharing activities are the cases in which the individual has serious difficulties to engage in transfers of knowledge that would be beneficial for them. By this, it is expected to find clearer evidences of the awareness-related issues that can prevent individuals to engage in beneficial knowledge transfer activities.

Last, the selection of cases relating to *knowledge sharing practices* follows a **maximum variation sampling strategy**. The idea is to collect cases that differ one from each other in

the greatest proportion in order to study the variations and identify important common patterns (Miles et al 1993).

This section has described the sampling strategy used at two levels (a unit "master" case and its sub-units of analysis). The next selection is concerned with the methodology relating to the collection of the data which will constitute the different cases.

3.2.3. Data collection methods and instruments

Whereas case study research has suffered and still suffers numerous criticisms, many of them justified (e.g. Miles, 1979), the case study approach presents at least a serious advantage over other methods. It is broadly accepted that case study offers a rare "opportunity for holistic view of a process" (Gummeson 1991, pp. 76) and that the use of a combination of various sources for data collection results in better validity and reliability (Yin 2003, McCutcheon et al 1993). Eisenhardt (1989, pp. 538) claims that "triangulation made possible by multiple data collection methods provides stronger substantiation of constructs and hypotheses".

This research employed three data collection methods commonly used by theory-building scholars: semi-structured interviews, observations, company documents.

The selection of those data collection methods was dictated by the objectives of the research and the practical possibilities opened to the researcher. As Maxwell (2005 pp. 74) puts it, "your methods are the means to answering your research questions, not a logical transformation of the latter. Their selection depends not only on your research questions but on the actual research situation and what will work most effectively in that situation to give you the data you need". Without entirely agreeing with an approach which suggests that the selection of data collection methods is mainly based on the objectives the researcher wants to achieve, it is assumed here that the three common data collection methods used in this

research (interviews, observations, and company documents) will complement each other to constitute a satisfactory data collection of our cases.

Semi-structured interviews

Yin (2003, pp. 89) argues that, since most case studies are concerned with human affairs, interviews are "one of the most important sources of case study information". This research does not contradict the Yin's claim.

In contrast to questionnaires or structured interviews, semi-structured interviews were preferred as they often prove more fruitful when collecting different subject's viewpoints (Flick, 2002) and as they offer a greater breadth (Denzin and Lincoln, 2000). Also, because the terminology pertaining to knowledge and knowledge sharing is often ambiguous, and since most researchers are faced with the technical jargon of the subject he or she studies, face-to-face interactions have allowed to immediately clarify and circumvent any major misunderstanding (Parkhe, 1993).

A checklist of questions (see Appendix A) aimed at guiding the interviews was designed and used in regard to the objective of the research. As Yin (2003) pointed out, research questions and interview questions are different but linked. The purpose of the data collection is to gather as much quality and unbiased data on the cases that have been chosen according to certain pre-defined criteria. In the context of this study, the researcher is interested in cases relating to bottom-up knowledge sharing events, individuals who face difficulties in receiving knowledge and last, knowledge sharing mechanisms. The instrument to be used when interviewing has therefore been crafted with the clear purpose of obtaining an unbiased collection of rich data that would pertain to the sought cases.

Interviews were all face-to-face on-site interviews except one (phone interviews) and were conducted in French (the mother tongue of both the researcher and the interviewees). The list

of skills necessary to the good case study investigator, suggested by Yin (2003, pp. 59) was understood and taken as much as possible into consideration:

- Ability to "ask good questions and interpret the answers",
- Being "a good listener and not be trapped by his or her own ideologies or preconceptions",
- Being "adaptive and flexible",
- Having "a firm grasp on the issues being studied",
- Being "unbiased by preconceived notions".

The interviewees were chosen according to practical and purposive criteria.

Informant	"Knowledge Sharing Event" cases	"Individual" cases	"Knowledge Sharing Mechanism" cases
Senior manager – business process coordinator	Case 1a, Case 1c, Case 1e	Case 3a, Case 3c	Case 2a, 2b, 2d, 2t, 2v
Sales Manager – small and medium accounts	Case 1e, Case 1f		Case 2a, 2e, 2h, 2l, 2o, 2p
Sales Manager – big accounts	Case 1e	Case 3c	Case 2a, 2e, 2h, 2m, 2o, 2s
Technical advisor			Case 2o
Sales Administration Manager	Case 1c		Case 2a, 2o
Installation/Maintenance Center Manager	Case 1a		Case 2a, 2b, 2f, 2j, 2l, 2n, 2q
Installation/Maintenance Center Manager	Case 1b	Case 3a	Case 2b, 2e, 2f, 2k, 2n, 2q, 2r
Logistic and Network Supervisor			Case 2k, 2t
Technician team manager	Case 1c		Case 2b, 2c, 2e, 2j, 2k, 2m, 2r, 2v
Technician team manager	Case 1d	Case3b	Case 2b, 2c, 2l, 2j, 2n, 2o, 2t, 2p

Back Office Manager	Case 1c		Case 2e, 2l, 2o, 2p
South-west PABX director (phone interview)	Case 1c, Case 1e		Case 2c, 2e, 2d, 2m, 2s, 2u, 2t, 2v

Direct observations

Supplementing semi-structured interviews, direct observations were used as an additional data collection method. It consisted in witnessing first-hand relevant events, behaviors and environmental conditions directly on the cases' sites with no participation of the researcher (Yin, 2003). The data collection comprehended a visit of the seven locations in which the interviews were conducted. Most of the time, a tour preceded the interviews planned on a certain site. The data were particularly helpful in understanding the overall context in which the cases took place.

Company's documents

The access to a variety of documents on the FRANCE TELECOM Group and the PABX division complemented the rich set of data collected from interviews and direct observations. Internal documents included written reports describing products, organization structure, business processes, a few presentations that gave operational and financial figures, emails exchanged by employees while sharing knowledge, emails exchanged between managers stressing the importance of such or such knowledge transfers, and a report from a consulting firm comprising a section on communication. It also comprehended an access to the intranet of the company during the data collection period. Documents, like the company annual report or business press releases were also collected from external sources such as the internet.

Triangulation

Every data collection method unquestionably presents weaknesses, limitations and runs the risk of systematic biases. The term of "triangulation" have been introduced in sociology long

ago and has now spread to many other disciplines. The sociologist Denzin (1970) states that triangulation refers to the collection of information from a diverse range of individuals and settings by using a variety of methods. More precise, the Patton (1987) perspective distinguishes four levels of triangulation: triangulation involving multiple data sources (different persons, different places…), triangulation involving multiple researchers, investigation involving multiple theories and triangulation involving multiple methods (interviews, archives, experiments…). The underlying rationale is that obtaining converging lines of inquiry makes any findings more convincing and accurate (Yin, 2003) and reinforce construct validity (Stuart et al, 2002).

A look at the above section shows that this research takes advantage of the triangulation technique at the data source level and collection method level. For instance, several managers were asked to describe a same event. Identical questions pertaining to the use of certain knowledge sharing mechanism were repeatedly inquired, etc… A triangulation that would imply several researchers and several theories was put aside because of time and resources constraints. However, as Miles and Huberman (1994) commented, the most important benefits of triangulation come from its careful and systematic use along the research process. Triangulation should not be considered as a formal strategy that applies to the data collection phase.

In regard to this triangulation perspective, the table below (see Table 18) gives an account of the different data sources and different collection methods used.

Site	Date	Interview	Secondary sources
Marsani	June 2004 – August 2004	Senior manager – business process coordinator	Personal observation Intranet Email history Attendance at meetings Project documents Newsletter
Belleville	September 2004	Sales Manager – small and medium accounts	Personal observation Internal documents
Nidalou	September 2004	Sales Manager – big accounts	Personal observation Internal documents
Belleville	September 2004	Technical advisor	
Tiramont	September 2004	Sales Administration Manager	Personal observation Intranet Information Systems
Belleville	September 2004	Installation/Maintenance Center Manager	Personal observation Information system
Carbenet	September 2004	Installation/Maintenance Center Manager	Personal observation Benchmarking reports
Panamo	September 2004	Logistic and Network Supervisor	
Axiton	September 2004	Technician team manager	Personal information
Belleville	September 2004	Technician team manager	Personal information Internal documents
Belleville	September 2004	Back Office Manager	Personal observation
Marsani	October 2004	South-west PABX director (phone interview)	Email history Report from a consulting Firm

Table 18 - Data sources and data collection methods

3.2.4. Analyzing data

The data analysis phase is defined by Yin (2003, pp. 109) as consisting of "examining, categorizing, tabulating, testing, and otherwise recombining both quantitative and qualitative evidence to address the initial proposition of a study". Data analysis plays a critical role in theory building but most scholars agree that it is one of the most challenging phases of the case research process. Eisenhardt (1989, pp. 539) pointed out that "analyzing data is the heart of building theories from case studies, but it is both the most difficult and the least codified part of the process" and Yin (2003, pp. 109) echoed that "the analysis of case study evidence is one of the least developed and most difficult aspects of doing case studies". The investigator's set of skills that are required to conduct properly this phase of research remains for the main part an unsolved mystery (Stuart et al, 2002).

Additionally, the data collection in a case-study-based research usually generates a large volume of data and their analysis often requires a great deal of time and effort (Van Maanen, 1987). Miles (1979) wrote almost 30 years ago that, notwithstanding its attractiveness, one of the most serious weaknesses of qualitative data is that their collection and particularly their analysis is a highly labor-intensive operation.

This research is no exception. Several months have been allocated to the analysis and interpretation of collected data. Fortunately, despite the lack of precise guidelines bearing on this phase of the research, numerous senior investigators have shared their experience through a variety of articles and books and various frameworks have been suggested to help researchers go successfully over the analysis stage. As two leading scholars in this field, Miles and Huberman (1994, pp. 10) explain that data analysis consists of three concurrent flows of activity: data reduction, data display, and conclusion drawing/verification. Data reduction is defined as "the process of selecting, focusing, simplifying, abstracting, and transforming the data that appear in written-up field notes and transcriptions" (ibid, pp. 10). Data display refers

to the process of creating “organized, compressed assemblies of information that permits conclusion drawing and action” (ibid, pp.11). Last, conclusion drawing/verification describes the time when “regularities, patterns, explanations, possible configurations, causal flows and propositions” are noted and conclusions verified through more or less elaborate protocols (ibid, pp. 11). There is no need to say that during the research, the three streams of activity flow concurrently and are deeply intertwined, spanning from data collection to data analysis stages.

In this study, data reduction was obtained through different techniques. Notes were taken during the interviews and were complemented afterward by additional annotations. Data felt as irrelevant in regard to the concerns of this study were carefully put aside. Summaries of sub-cases (knowledge sharing events, knowledge sharing mechanism descriptions…) were written. Data display took advantage of a variety of suggestions coming predominantly from the Miles and Huberman’s book (1994). It included various types of matrices, graphs, charts, vignettes, and network views. Conclusion drawing and verification hinged both on within-case analysis and cross-case analysis. A variety of analysis techniques, such as “pattern matching”, “time-series analysis”, “logic models” (Yin, 2003), were tentatively employed with the objective of making patterns, regularities or propositions more visible. The emerging theory was tested against each of the various cases collected. Brainstorming sessions and reviews before peers and supervisor proved also very useful for both bringing forward new conclusions and for verifying/refuting working sets of hypotheses.

All the above, may it be defining proper units of analysis, choosing appropriate sampling strategies, designing effective data collection methods and instruments or taking advantage of fruitful analysis techniques, was all designed and performed with the underlying objective of answering the formulated research questions through a research of great quality. The term of quality is not obvious and the next section aims at concluding this chapter with a brief review of the standards against which the quality of most case study research is usually measured.

3.3. RESEARCH VALIDITY AND RELEVANCE

Understanding the soonest the evaluation criteria on which every study is evaluated is essential to produce good research. Indeed, researchers who are able to anticipate all along the research process the criticisms and weaknesses that may arise at later stages have the opportunity to proactively integrate in their research design solutions that are likely to fend off coming difficulties.

Most research in social science is evaluated upon two sets of criteria. The first set of criteria is concerned with the validity of theories that are developed. The second set takes sides with practitioners and questions the relevance of the proposed findings.

To say little, many scholars, influenced by the positivist paradigm, view validity as the most substantive dimension to consider when appraising the quality of an empirical work (Stuart, 2002). This concern finds a relatively standard response in the case of quantitative studies for which sophisticated statistical tools comprehend sets of recognized metrics dedicated to this matter. In the context of case research, the issue of validity has fueled raging debates (e.g. Yin, 1981 answering Miles, 1979). To help researchers employing the case-based approach, Yin (2003) identifies four important types of validity and recommends several tactics to keep off a variety of validity pitfalls. The table below (Table 19) summarizes the Yin's framework and gives an account of the tactics that were exploited by the researcher to improve the validity of the present research.

Tests	Description	Case-study Tactic	Phase of research in which tactic occurs
Construct validity	Establish correct operational measures for the concepts being studied	Triangulation by data source and data collection method. Presentation of the employed chain of evidence. Draft case study report reviewed by key informant.	Data collection
Internal validity	Establish a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships	Did pattern-matching Did explanation-building	Data analysis
External validity	Establish the domain to which a study's findings can be generalized	Used replication logic in multiple-case studies	Research design
Reliability	Demonstrating that the operations of a study – such as the data collection procedure – can be repeated with the same results	Used a case study protocol Developed a case study database	Data collection

Table 19 - Research validities and Tactics used to improve them (Source: adpated from Yin, 2003 and Stuart et al, 2002)

In the recent years, numerous critics rose and denounced the limitations of considering solely tests of validity. Their main assertion was that, while establishing validity is unquestionably a requirement for any research, validity itself is not sufficient. Research and theories should be somehow related to practitioners and to issues that are important to the "real" world. The concept of relevance becomes central in this matter and the positivist paradigm has had its weaknesses discussed vigorously (Romme, 2003; Morgan and Smircich, 1980). For instance, Bennis et al (2005) wrote that business schools have adopted an inappropriate model of academic excellence based exclusively on scientific rigor. The researchers condemned boldly and emphatically the lack of relevance exposed by the today's research in business schools.

To ward off the lack-of-relevance peril, this research takes advantage of the Thomas and Tymon's work that suggests five criteria against which every research should be evaluated.

Resting on this framework, a range of initiatives has been taken to verify the appropriate usefulness of the findings presented in the following chapter.

Criteria of practical relevance or research usefulness	Addresses…	And achieved by…
Descriptive relevance	Whether or not the research captures a "real" problem for the practitioner".	Constructive discussions with and positive feedbacks from practitioners in France Telecom. Thorough review of extant literature (see chapter 1 and 2). The scanning of recent publications demonstrates the unquestionable importance of awareness for effective knowledge sharing (e.g. Hansen 2005, The Economist 2006).
Goal relevance	Whether the output of the research is related to the objective function of organizations.	
Timeliness	Whether the phenomena change faster than science can come to grips with the problem.	
Operational validity	Whether the results of the research can be implemented by manipulating causal variables.	The refinement of "awareness" into three clear types allows practitioners to diagnose precisely the awareness issues their organization may face. The knowledge sharing mechanism selection framework is a tool immediately usable by managers to take steps toward addressing those identified issues.
Non obviousness	Whether or not the research simply reinvents the wheel.	This research has brought forth new insights on the nature and role of individual awareness in the knowledge sharing process and has showed how different mechanisms influence differently its development. Chapter 2 insures that this perspective has not been endorsed by anyone before.

Table 20 - Practical relevance of the research
(Source: Adapted from Chai, 2000 and Thompson and Typon, 1982)

3.4. CONCLUSION

Concluding a synthesis on the contributions and limitations of extent literature, the previous chapter has unveiled and formulated a set of unanswered, albeit promising, research questions bearing on the awareness stage of the knowledge sharing process and the impact of knowledge sharing mechanisms on this phase.

This chapter logically follows with the objective of describing and justifying the selected research methodology. It was argued above that the nature of the research questions and the lack of integrated theories that would relate to them forcefully call for an interpretivist-flavored approach and a case-study methodology. Research design and implementation were presented next, along with the rationale that underpins the many choices made. Building upon a single master-case within the FRANCE TELECOM Group proved to be an appropriate decision in regard to the research objectives and constraints. The variety of data collection methods and the reliance on multiple sources were essential for triangulation purposes and validity matters. The complex and delicate analysis phase took advantage of a range of techniques applied for within-case or cross-case investigations. Last, this chapter discussed the validity and relevance criteria that were considered and gave an account of the various initiatives taken to ensure the quality of the present work.

4. Main case study and findings

4.1. Background

This in-depth case study aims at shedding new lights on the term “awareness”, the first stage of the knowledge sharing process and a prerequisite for knowledge transfer. It will focus on the refinement of its definition, the study of its fundamental components, the processes that lead to its development, and last but not least, on the relationship it has with knowledge sharing mechanisms.

Access to the company have been initiated through a senior process manager in charge of improving processes, collaboration, and knowledge sharing within his network of operations.

Data collection relied on interviews, direct observations, and company documents. In a 3-week time period, semi-structured interviews lasting an average of 3 hours were conducted with twelve senior managers and middle managers from a selection of various departments in seven different geographical locations. Five follow-up phone interviews with the senior project manager took place after the first round of interviews to get more information on some specific issues and stories. Archives made of past emails and consulting reports were studied as well as internal documentation of processes and studies.

4.2. Introduction

The study was conducted in the south-east geographical area of the national FRANCE TELECOM PABX division.

4.2.1. FRANCE TELECOM GROUP (The parent company)

As it has been the case for many European telecommunication firms, FRANCE TELECOM GROUP was created originally as a government-owned communication company operating nationally and benefiting from monopoly regulations. Today, FRANCE TELECOM GROUP is a private company and is considered as one of the world's leading telecommunications carriers with more than 120 millions customers in 220 countries. The turnover in 2004 reached almost 50 billions euros and the group headcount is over 200,000 employees. With a broad range of services including fixed line, wireless telephony, data transmission, and internet services, sales come from individual consumers and business customers worldwide. The study took place in one of its national growing business, the PABX division.

4.2.2. FRANCE TELECOM PABX division

This study is concerned with the PABX business. "PABX" is an abbreviation which stands for "Private Automatic Branch eXchange". Those telephonic equipments connect companies' private phone lines to the public telephone network (see APPENDIX C). Customers range from companies from 3-employee SMEs to giant multinationals.

For the FRANCE TELECOM group, this division has become more and more strategic and challenging in the recent years. The PABX business is strategic because the installation of those equipments opens the door to additional profitable sales with acquired customers. What's more, from a more global perspective, the group is striving to offer sets of fully-integrated services to customers.

While the strategic importance is clear, many challenges lay ahead. This business is fairly new to the group. Until recently, those operations were handled by an independent subsidiary, named COFRATEL, specialized in installation-integration activities with approximately 1350 employees. In 2004, FRANCE TELECOM has decided to vertically integrate this subsidiary

in its main structure in order to promote a set of fully-integrated offers to its customers. The number of functions involved in the business process is high. From order taking to installation and maintenance, more than 8 core functions are involved. The scope of operation is national but many different levels of management coexist. Some departments have a national responsibility, others a regional one, others a very local one. Last, employees are spread out geographically because of the business requirements but also because of historical legacies. As a result, knowledge sharing is difficult. However, the top-management made a clear point of making this happen and so, efficiently. Indeed, islands of knowledge need to be bridged. Some individuals from formerly different companies have very interesting knowledge that should be shared with others. Knowledge is not uniformly distributed over the network of operations. Some areas are very well gifted while some others are striving to know more. Additionally, improved knowledge sharing between the numerous different departments would be beneficial in building a common understanding and improving business operations. As a result, FRANCE TELECOM has implemented a rich variety knowledge sharing mechanisms and emphasis was placed upon knowledge sharing and organizational learning issues.

Our data collection took place in the south-east region of the national PABX business, one of the most important regions in term of business turnover. The region encompasses 10 different sites and the PABX business for this area involves nearly 400 people for a turnover over 60 million euros a year.

4.3. AWARENESS

4.3.1. Awareness, a critical stage of the knowledge sharing process

Knowledge sharing is a well-established topic of the knowledge management field. In the literature review chapter, it was argued that two main phases constitute the knowledge sharing process: an "awareness" phase followed by a "knowledge transfer" phase. The *transfer* stage has received considerable attention from researchers. The *awareness* stage, harder to observe, was not investigated with such diligence despite the proven significance of its role in the knowledge sharing process.

For now, as a working definition, *awareness* is described as the piece of knowledge needed to identify at an individual level what advantageous knowledge should be transferred from who/where to who/where. Extensive thoughts on this concept will come up later.

The following vignettes give an account of 6 real-world stories encountered in FRANCE TELECOM. Each of those vignettes describes a knowledge sharing event concluded by the transfer of a useful knowledge. In regard to the research objectives, emphasis is placed upon the stage that comes before a transfer, or in other words, upon the process through which awareness is developed.

4.3.2. Vignettes on awareness and knowledge sharing

In order to know more about the development and usage of awareness by individuals, the managers I interviewed were asked to describe one or several events in which they or some of their direct employees had been involved in horizontal knowledge sharing (see Appendix A). Once an event had been described in details, more questioning focused on the awareness stage. Hereafter, using a vignette presentation, are presented six of the most interesting events of lateral knowledge sharing that emerged from our interviews.

Vignette 1a: In the PABX business, maintenance of on-customer-site equipments is a very important aspect. If the PABX of a customer is down, its phone lines are not connected to the telephonic network and its business may be severely damaged. After a storm, it regularly happens to have an emergency period because lightnings burn some of the equipments. Technicians are then mobilized to diagnosis and repair the breakdowns as swiftly as possible.

In the service center of Belleville, some of the technicians started to wonder if it was possible that certain models of PABX or some specific components were somehow more likely to be affected by storms than others. This issue was first raised during a weekly operational review meeting (hold every Friday as one of the initiatives prescribed by the “lean management” program being implemented) in which technicians discuss the issues they have faced during the week and the solutions that have been tried out. After several formal and informal discussions, the team decided to dig further into the issue and to try to find a satisfactory answer regarding this eventual relationship between break-downs and types of equipment.

A research on the intranet and on the national electronic forum for technicians was unsuccessful. Some technicians of the center sent a few emails and the issue was informally raised when calling some former colleagues who had moved to different regions.

Answers came back from the different actors. Discussing the issue over the phone, many technicians answered “that’s interesting, but, you know… we do not have so many storms and for the few we had, we did not notice anything…”. Some other answers were not relevant or not helpful. Two weeks after the initial wondering and the beginning of the search, a very promising email came out from Robert Stamford, a former colleague of the Belleville service center who had been transferred to another location. The center he was now working in was located in Saint Nicolas, a particularly stormy location between land and sea. The email said that his new center had indeed noticed a similar kind of pattern and had taken steps to better deal with it. Robert informed his former colleagues that his new team was maintaining and using a worksheet giving statistics of break-downs depending on the type of material and the

geographical area. This was used to place more thoughtful orders in the purchasing system and to optimally maintain stock levels. The team from Belleville was invited to ask for more information if interested.

The technicians from Belleville planned a phone conference to discuss the question directly with their counterparts from Saint Nicolas. They were sent the worksheet and learned how it was maintained and used by their colleagues. They understood from them that it was believed that certain areas were more harshly affected by lightnings and, most importantly, that certain hardware configurations had weaker resistance properties to electric power surges. The team in Belleville now uses this new knowledge to better forecast their needs in PABX cards and equipments.

Vignette 1b: Mr. Smith is the manager of about 45 technicians from the PABX installation and maintenance center of Carbenet. Previously working in another department, the position is new to him. In the first days, he rapidly became familiar with the local file sharing server of the center. Lately, as he was browsing the various folders with the objective of preparing the next monthly inter-center phone meeting, he opened a few of the operational reports he encountered. One of the documents exposed a set of reporting sheets that were fairly innovative compared to what he was used to work with.

Indeed, a financial perspective was emphasized. Stock levels, time spent on installations and repair works were accurately recorded, costs were allocated and calculated in details, etc. Mr. Smith was aware that a financial focus had not been originally particularly promoted in the corporate culture. But he also knew that this was changing and that financial performance was rapidly becoming a focal interest. After some time spent reflecting, he thought that it would be valuable to him and the company to get some more knowledge from this discovered reporting procedure and to go further in this direction, to go toward a more cost-analysis oriented management.

Asking around, he shortly discovered that Mrs. Tyler, a former COFRATEL employee recently arrived in FRANCE TELECOM, was the author of those documents. They met and spent time to think and share together their knowledge before institutionalizing the use of this reporting format.

Vignette 1c: Every year, a regional convention takes place where all people related to the PABX business meet altogether for one day. A total of more than 300 managers, salesmen, technicians, etc are invited. The time is spent talking informally and attending presentations prepared by different actors. Employees come to know more people and exchange a lot about what they do and the problems they face.

Because the PABX business has been recently integrated to FRANCE TELECOM, the PABX organization structure and processes are still young. At the convention this year, it appeared that during the event many minor problems between sales department and production department were raised and discussed by the actors directly. First, employees would get acquainted with each other, and secondly, knowledge about processes and the sales/production interface could be exchanged. For instance, many salesmen met for the very first time technicians they had known only by name. During the event, they were able to develop personal ties with them and business cards were exchanged.

Throughout the days that followed, commercials and technicians took the time they needed to reflect about the knowledge they had received from their informal chatting. Some points seemed very interesting and needed to be explored further. For example, during the convention, salesmen learned that PABX technicians maintained and used a table in which the average times associated to the setting-up of different PABX configurations were recorded. In the small-business PABX sales department, during the weekly review of operations, the discussion turned to the poor performance of the sales team when it comes to give clients realistic dates of PABX implementation. Too often, the installation schedules

given by salesmen to customers were not respected. A simple line of thought emerged. First, it had to be noticed that the installation time varies depending on the type of PABX that is installed. Secondly, the table maintained by technicians that had been recently discovered would greatly help planning a realistic installation date. Last, and going further, it was realized that salesmen needed more knowledge about the installation process in order to improve customer relationship. Unquestionably, the sought knowledge was possessed by technicians. A series of meetings dedicated to addressing this issue was planned by the sales team manager and involved both salesmen and PABX technicians.

Vignette 1d: Mr. Baumet is a PABX technician responsible for installing complex PABX solutions on his customers' sites. His "territory" includes a regional capital. As a result, the solutions he has to install are often complex and particularly heavier than the solutions installed in more rural areas. More and more, the PABX equipments he installs have to be integrated with the existing customer hardware and software (like servers owned and maintained independently by customers). In order to satisfy customer needs, a reconfiguration of the customer equipment is often necessary. Mr. Baumet feels that, although he is very skilled for installing PABX, he does not have any knowledge on how to make the equipment he installs fit with the existing customer configuration. Many times, he has been frustrated trying to help a customer configure his server or setting-up his local area network. One day, as a difficult situation happened with one of his client, he reflected and told himself that knowing more about server configurations and local area network would be really helpful to help his customers, and would increase his and their satisfaction. Searching on the intranet, he found the contact details of a colleague, Mr. Violet, from the network division with whom he had met some time ago in a huge joint installation project. After a phone call, the two colleagues agreed to have a friendy lunch the next day. During this lunch, they discussed their job and their respective difficulties. Mr. Baumet was confirmed that knowing more about server configurations and some part of IP network administration would

definitively be helpful to him and his team. Armed with his new understanding on how the network administration could help, he expressed his view to his team manager. It was then decided that his team would receive a formal training on the issues that seemed most critical and that their responsibility will expend to assisting customers in reconfiguring their installations when possible. The team performed a lot better after this training. Time spent on the customer site was reduced, customer satisfaction increased as well as the team self-esteem.

Vignette 1e: Mr. Gilman is a salesman in the PABX small-business department. His customers are mainly small businesses from 1 to 50 employees. As he has been working in this division since its creation, he knows fairly well all his counterparts and the people he work with. One day, he discussed with his manager Mr. Falson about the possibility to be transferred for one month in the PABX enterprise division, in order to meet new people and know more about what they do. The PABX enterprise division is also selling, installing, maintaining PABX equipments. The difference is that their customers are bigger, mostly large firms, public companies, schools, hospital, etc… This practice is encouraged by management in FRANCE TELECOM. Mr. Gilman was transferred there and worked with a team totally new to him. He made a lot of connections, partly with his team of course, but also with the marketing people. Additionally, he learned about the existence of new channels of information on the intranet. Going further, he discovered that a trend seems to emerge: the development of integrated solutions including wireless wifi technologies and VoIP. After he joined back his original team in the PABX small-business division, he discussed with his manager his experience and the learning he had gained out from it. The two of them contacted the PABX enterprise team and asked whether they could be kindly sent some of the documents the enterprise team may have had on wifi and VoIP solutions. Together, they have been able to study the documents and are prepared to sell new offers targeting the professional markets.

Vignette 1f: Mr. Falson works in FRANCE TELECOM Group as sales manager of the PABX small-business division of the south-east region. Until very recently, the small-business division and the enterprise division of the PABX department shared a same set of sales/installation processes. While those business processes gave satisfying results in the enterprise division, it was found that their complexity and lack of flexibility hindered significantly the activity and performance of the small-business division. Mr. Falson pro-actively took the responsibility of designing, implementing and monitoring a crash program that aimed to simplify processes and boost sales figures, the initiative being experimented in the south-east region. Example of changes pushed through the program was that new salesmen benefit schemes were proposed, additional training of sales teams were performed, technicians were encouraged to spend a full day accompanying a salesman meeting clients, etc... The program proved to be a success according to senior managers. Sales dramatically increased, motivation of employees climbed to unknown levels, and most importantly, almost everyone reported to have learned something in a way or another.

The corporate department of the PABX division found the crash program worth to be presented on the corporate portal and through the PABX newsletter. An article describing the overall project, the difficulties encountered, and its achievements, was published in the two media. Interestingly enough, a few days later, Mr. Falson received a call from Mr. Poiset, a peer from the PABX division who had the same job position in the north region of France. Mr. Poiset explained that he had read about the crash program in the PABX newsletter. He added that, very interested in it, he had called the corporate department and had been advised to directly contact Mr. Falson. The two sales managers booked a convenient time in their agenda and the experience was discussed extensively afterward over the phone.

4.3.3. Awareness - 3 different dimensions

The 6 vignettes above give a precise account of six events in which a piece of knowledge is shared among organization members within the company. In contrast to most of previous research on knowledge sharing, emphasize is placed upon the stage that comes before the transfer of an identified piece of knowledge from an identified source to an identified recipient. From a process perspective of knowledge sharing, it is broadly accepted that the stage awareness (awareness of an existing piece of knowledge mainly) precedes the stage transfer (a piece of knowledge is transferred from a source to a recipient).

By looking back at the data that were collected, and after reviewing and discussing attentively the notes taken during the interviews, it was noticed that the concept of awareness cannot be deemed as a unidimensional construct but is rather made up of three different important types of awareness. The three of them are necessary to initiate any knowledge transfer and can be acquired simultaneously or sequentially in different ways by organization members.

The three types of awareness we propose are:

- **Awareness of a Knowledge** existence,
- **Awareness of a Source** that can deliver the piece of knowledge,
- **Awareness of a Need** for the piece of knowledge.

Awareness of a Knowledge existence (or Awareness of WHAT): in order to initiate any transfer of knowledge, employees need to be aware in the first place that a certain piece of knowledge exists somewhere. In vignette 1a for instance, the information presented on the web portal and the answers coming from emails and phone conversations are what allowed technicians to understand what knowledge was available outside their unit. In story 1b, Mr. Smith learned about the existence of a piece of knowledge pertaining to financial-oriented management by browsing and reading the archives residing on the file sharing server of his

center. In story 1c, it is during the annual convention that members of the small-business sales team obtained the awareness that a table maintained by technicians was available.

It has to be pointed out that being aware of the existence of a certain piece of knowledge is different from having this knowledge. For instance, in vignette 1f, while Mr. Poiset has the awareness that a “crash program” is being experimented in the south-east region thanks to the description given in a newsletter he had found in his mailbox, he does not know enough to fully put this knowledge into practice for his business. In other words, the state of awareness is different from the state of knowing in a sense that being aware of the existence of a piece of knowledge is not sufficient to use it as to take actions or to take decisions. The awareness of the existence of a piece of knowledge is not a deep knowledge, but rather a shallow meta-knowledge that allows one to consider the full piece of knowledge for an eventual knowledge transfer. For instance, in vignette 1d, Mr. Violet has shared some of his knowledge with Mr. Baumet who, after their discussion, knows a lot more about what knowledge exists in the area of server configurations and IP network administration. This awareness of existing knowledge gives him a clear idea of the things he could achieve if he had received the discussed knowledge. Yet, at this stage, no complete transfer of knowledge was achieved and his new awareness cannot be used on-the-job to improve his work performance.

As a conclusion, it can be said that the awareness of a knowledge existence is the awareness mostly referred to in literature. It is the knowledge that a piece of knowledge exists. The above vignettes suggest that this type of awareness necessarily precedes any complete transfer of knowledge.

Awareness of a Source (or Awareness of WHERE): A finding that emerged clearly from the cases is that being aware of the existence of a piece of knowledge is not enough for any transfer to happen. A second type of awareness is needed. Namely, the awareness of a source ready to give its knowledge is absolutely necessary before considering any further

development in the knowledge sharing process. It constitutes the answer to the question of where to get the knowledge transferred from.

For instance, in vignette 1b, Mr. Smith discovers the existence of a report that makes him aware of the existence of an interesting piece of knowledge residing within his center. However, he will find the author only after a brief search. In vignette 1f, the sales team manager of the small-business PABX division of north region got aware of the crash program being experimented in the south-east region thanks to the PABX newsletter. He will find the contact information of Mr. Falson only after he has called the PABX newsletter edition team. Similarly, vignette 1d shows that Mr. Baumet has to use the corporate yellow pages before he can plan a lunch with his colleague specialized in server and IP network administration.

It has to be remarked that some cases of knowledge sharing events exhibit instances where the awareness of the existence of a piece of knowledge is obtained directly from a knowledge source ready to transfer it. Those cases therefore expose a simultaneous development of an awareness of knowledge existence and of an awareness of knowledge source. Vignette 1a illustrates this situation. Indeed, the email from Robert Stamford tells in the same time that a piece of knowledge that answers the question from the Belleville team exists and that the talked-about piece of knowledge can be acquired from the Robert's team.

To sum up, it has been suggested in the previous sections that two types of awareness were simultaneously required before considering any knowledge transfer: the awareness of a piece of knowledge existence, and the awareness of a source ready to offer its knowledge. The following paragraph completes the section by claiming that a third type of awareness is required: the awareness of a need for the piece of knowledge.

Awareness of a Need (or Awareness of WHY): the last type of awareness is not so obvious but the cases that were encountered stress its importance. Basically, it is the awareness that

you lack some sorts of knowledge and that knowing more about a certain issue will allow you to perform better.

In some cases, this type of awareness comes from the realization that a problem is important and that this problem would certainly need a piece of knowledge in order to be addressed. This situation is illustrated in vignette 1a, where the team reflects and realizes that there may be a need for more knowledge about a possible relationship between storms and equipment break downs. They knew they did not know a lot and that knowing more would definitively prove helpful to manage their stock and supply policies. This situation can be compared to the problem-solving case in which the realization of a problem and of its importance leads to the search for a solution. The term of “problem-pull” would fit fairly well to the description of this perspective.

In some other cases, it is the discovery of a piece of knowledge that make one realize that he or she actually needs this knowledge. This situation is illustrated in story 1b for instance. Indeed, after Mr. Smith went through the reporting documents left by his predecessor, he realized that his relatively poor background in finance and cost-oriented management could be improved and would positively benefit his management and business. In vignette 1c, all the employees of the PABX business of the region met and discussed together the evolutions of their organization, the emerging opportunities, and the problems that had arisen. After the annual convention, one important activity for each organization member was to reflect and understand what knowledge needed to be transferred in regard to what knowledge they already had and what knowledge was really important.

To clarify the idea raised in the two previous paragraphs, one may cite the questioning of Rogers (1995) in the field of diffusion of innovation: is it the awareness of a need which leads to the awareness of an innovation or is it the awareness of an innovation which leads to the

awareness of a need. If we transpose the question to the knowledge sharing field, in our context at least, the data shows that it happens both ways.

The following proposition summarizes the findings presented in this section.

PROPOSITION 1: The awareness, commonly referred to in literature as the stage preceding knowledge transfer, is actually constituted of three constituents: the awareness of a Knowledge existence, the awareness of a Source ready to transfer it, and the awareness of a Need for acquiring a new knowledge.

In other words, it is found that the knowledge transfer stage can actually start only after the recipient has developed an awareness of what to transfer, of where to transfer it from, and of why a transfer is needed.

4.3.4. The paths toward the development of complete awareness

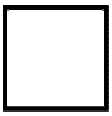
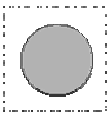
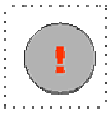
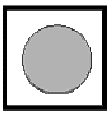
In the previous section, it is argued that the ability for an individual to engage in a knowledge transfer stage hinges on the simultaneous existence of three types of awareness. The six vignettes that were presented above place a clear emphasis upon the period that precedes in each case the transfer of a certain piece of knowledge. This helps to better understand, not only what are the types of awareness required for a knowledge transfer to happen, but also sheds lights on the process through which organization members build the three identified types of awareness.

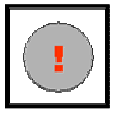
In order to facilitate the understanding and presentation of the process that is involved as organization members develop their awareness, a visual representation of the individual "awareness state" is proposed.

8 (=2*2*2) different states of awareness development are suggested resulting of the consideration of 2 levels of awareness of a knowledge existence ("0" for no awareness of

knowledge existence, “1” for awareness of knowledge existence), 2 levels of awareness of a source (“0” for no awareness of a source, “1” for awareness of a source), and 2 levels of awareness of a need (“0” for no awareness of a need, “1” for awareness of a need).

Table 21 - Height states of awareness before a knowledge transfer

	Description	Awareness of Knowledge existence	Awareness of Source	Awareness of Need	Symbol
State O	The future recipient is not aware of anything.	0	0	0	
State A	The future recipient has realized a need for knowledge but is not aware of the existence of a relevant knowledge neither of a source.	0	0	1	
State B	The future recipient knows a source that has an interesting knowledge but is not aware of the existence of the knowledge and is not aware of a need for this knowledge.	0	1	0	
State C	The future recipient has realized a need for knowledge and knows a source that could give this knowledge. However, the future recipient does not know about the existence of the knowledge.	0	1	1	
State D	The future recipient knows about the existence of a piece of knowledge but has not realized its need for it and is not aware of a source ready to transfer it.	1	0	0	
State E	The future recipient is aware of a need and of the existence of a piece of knowledge that answers this need. However, he is not aware of a source that would deliver the relevant knowledge.	1	0	1	
State F	The future recipient is aware of a piece of knowledge and of a source that could transfer it. However, the future recipient has not realized the need for the piece of knowledge.	1	1	0	

State G	The future recipient is aware of the existence of a piece of knowledge, is aware of a source ready to transfer it, and is aware of a need for this transfer.	1	1	1	

The table above (Table 21) gives an account of the 8 possible states implied by the distinction of three types of awareness. To better visualize the conceptualization, a specific caption is given for each awareness state. Awareness of a need is represented by an exclamation mark. Awareness of the existence of a piece of knowledge is represented by a full circle. Last, awareness of a source ready to transfer its knowledge is indicated by a bold square.

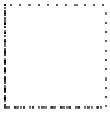
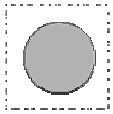
It is only in state G that an organization member can decide whether or not to try and engage in an advantageous acquisition and full transfer of knowledge. The variables pertaining to the decision to acquire knowledge via knowledge transfer does not hinge uniquely on the presence of the awareness itself. Indeed, the decision to acquire knowledge and the knowledge transfer itself depends also on the many variables described in literature, such as stickiness of knowledge, motivation of the recipient to acquire knowledge and of the sender to give his or her knowledge, cost of transfer, etc… The awareness is only an enabler that comes at an upstream stage of the knowledge sharing process.

Having said that, it may prove fruitful to consider not only the claim that state G is necessary to the pursuit of the following stages of the knowledge sharing process, but also the various paths which lead organizational members to stage G.

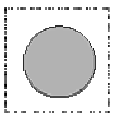
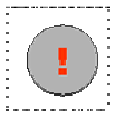
As an illustration, we propose to review vignette 1b using the conceptualization presented above. Indeed, in this case, Mr. Smith starts with none of the three awareness (state “O”) and ends up with the three (state “G”) after several moves from a awareness state to another.

His first move was the “accidental” discovery of a reporting document he encountered as he was browsing the files residing in the file sharing server. By making this discovery, Mr. Smith

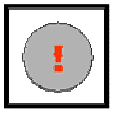
went from state “O” (none of the three awareness”) to state “D” (awareness of the existence of a piece of knowledge).

	→	
State “O” None of the 3 types of awareness	Serendipitous discovery of the existence of a piece of knowledge within the center relating finance-oriented operational management.	State “D” Awareness of the existence of a piece

The reflection he carried out resulted in the conviction that this knowledge relating to management using formal financial tools was something he could make good use of. This reflection transported him from state “D” to state “E” (awareness of the existence of a piece of knowledge, and awareness of a need).

	→	
State “D” Awareness of the existence of a piece of knowledge.	Reflection on the possible use of the discovered piece of knowledge.	State “E” Awareness of the existence of a piece of knowledge, and awareness of a need

Now, what was left to Mr. Smith was to discover who within, his center, was the author of the document and how this reporting practice had been used previously. By asking around among his employees, he quickly learned that Mrs. Tyler, who had recently joined the center, was the person who had designed and written the document. The brief search of Mr. Smith therefore made him aware of a source that had the knowledge he was interested in. Mr. Smith had finally reached state “G” (awareness of the existence of a piece of knowledge, awareness of a source ready to transfer its knowledge, and awareness of a need for the knowledge).

	→	
State “E” Awareness of the existence of a piece of knowledge, and awareness of a need	Search for the author of the document discovered.	State “G” Awareness of the existence of a piece of knowledge, awareness of a source ready to transfer, and awareness of a need for the knowledge

What is interesting in this conceptualization of the awareness concept and the study of the different paths that lead to it is that implications regarding its management can be drawn from a better comprehension in this area. This topic will be discussed later on when findings pertaining to the link that can be found between development of awareness and knowledge sharing mechanisms are presented. In this main section instead, it is proposed to focus on awareness and its development by individuals.

The following paragraph extends the study on the development of awareness illustrated by vignette 1b to all the other vignettes.

4.3.5. A three-dimensional representation of the paths to complete awareness

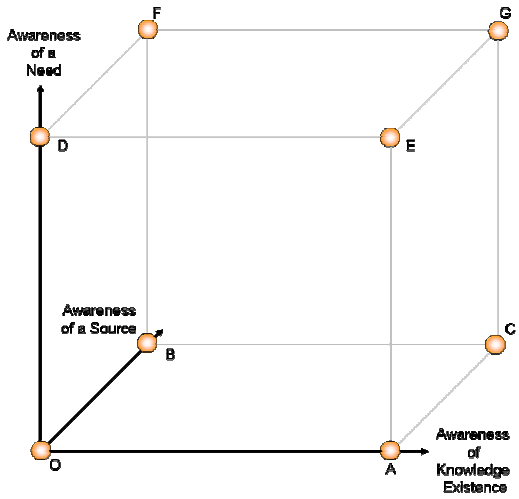
The previous paragraphs have claimed that the “awareness” described by literature as a necessity for knowledge transfer was actually a three-dimensional concepts and that several ways existed for individuals to acquire it. Vignette 1b was used as a detailed example to illustrate one of the path that leaded an individual from state “O” (unaware of none of the three types of awareness) to state “G”, meaning awareness of the existence of a piece of knowledge, awareness of source ready to deliver it and, awareness of a need for it. In this section, all the vignettes are studied and their different paths leading to state “G” are plotted

using a three-dimensional graph for illustration. Since vignette 1b has been used in the previous section to describe in detail how organization members can jump from an awareness state to another, the first "3-D" visual representation is proposed for this particular vignette. Vignette 1a, 1d, 1c, 1e, and 1f follow.

Vignette 1b – Starting by a serendipitous encounter

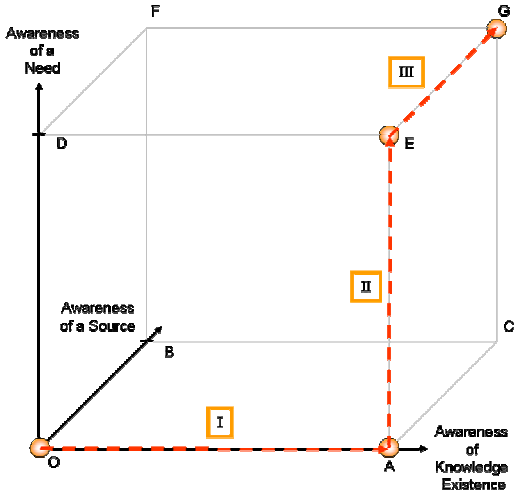
Table 21 (pp. - 122 -), in which 8 possible awareness states are presented, can be visualized in a 3 dimensional graph. Each state can be associated to a point with certain coordinates. Taking the first dimension as "awareness of knowledge existence" with two possible values ("0" for non awareness of knowledge existence, "1' for awareness of knowledge existence), the second dimension as "awareness of source" with also two possible values ("0" for non awareness of a source, "1" for awareness of a source) and a third dimension as "awareness of a need" with two possible values ("0" for non awareness of a need, "1" for awareness of need), each state can be described in a matrix form as followed:

$$O\begin{pmatrix}0\\0\\0\end{pmatrix} \quad A\begin{pmatrix}1\\0\\0\end{pmatrix} \quad B\begin{pmatrix}0\\1\\0\end{pmatrix} \quad C\begin{pmatrix}1\\1\\0\end{pmatrix} \quad D\begin{pmatrix}0\\0\\1\end{pmatrix} \quad E\begin{pmatrix}1\\0\\1\end{pmatrix} \quad F\begin{pmatrix}0\\1\\1\end{pmatrix} \quad G\begin{pmatrix}1\\1\\1\end{pmatrix}$$



This 3-dimensional representation of the different possible states is particularly helpful to plot the different paths followed by organization members as they intent to reach state "G", the final awareness state where knowledge transfer can be considered.

Indeed, taking the well-described vignette 1b, one can draw arrows to indicate the move from one state to another. A representation of the case given by vignette 1b is presented herebelow.



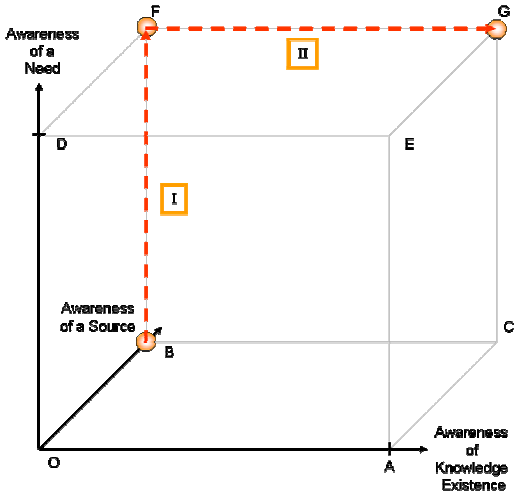
I] State "O" to state "A": Mr. Smith discovered a document about financial-oriented management.

II] State "A" to state "E": Mr. Smith reflected and realized the interest of knowing more about this kind of financial knowledge.

III] State "E" to state "G": by looking and asking around, Mr. Smith learned that the author of the document, Mr. Tyler.

The five remaining vignettes can be described using the same three-dimensional representation.

Vignette 1a – Storms and frequency of breakdowns

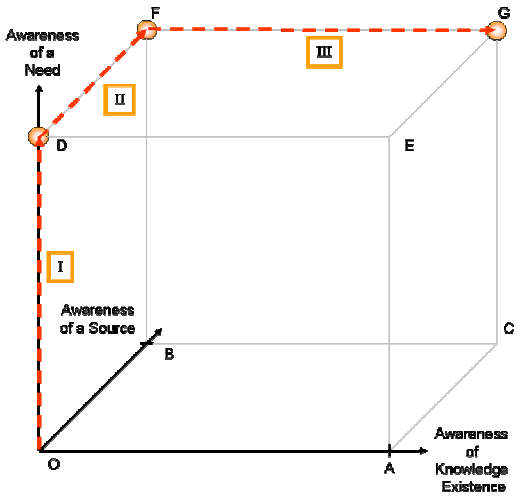


Nota: As the vignette starts, the awareness of an access to the source of knowledge is already known by the team. What is not known is that this source has some helpful knowledge to offer them. Therefore, the starting state for this vignette is state "B" rather than state "O".

I] State "B" to state "F": Through informal discussions and regular weekly team meetings, the team of Belleville developed the awareness that some kind of knowledge could be helpful in order to better predict what breakdowns are more likely to occur because of storms and lightnings.

II] State "F" to state "G": The Belleville team looked for a piece of knowledge within the company that could help them to improve their forecast of parts to be replaced. A known source of knowledge (a former team member who had moved to another site) was found to have this type of knowledge.

Vignette 1d – Extending PABX knowledge to network knowledge

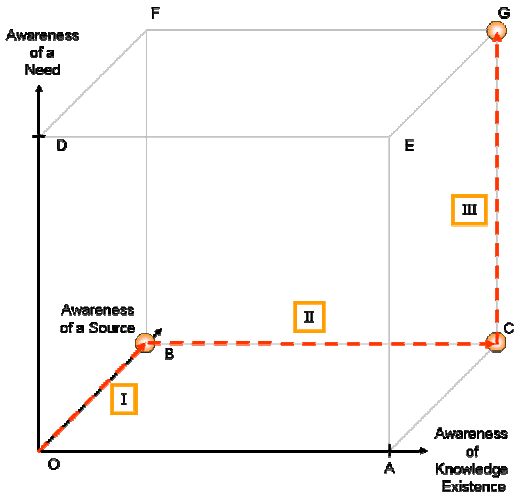


I] State "O" to state "D": Mr. Baumet, technician in charge of installing PABX, realized during an intervention that his efficiency in satisfying his customers was impeded by a lack of knowledge in the field of network administration.

II] State "D" to state "F": Mr. Baumet remembered a colleague from the network division whom he had met during a previous common intervention. He was able to find his contact information in the corporate directory.

III] State "F" to state "G": by meeting his colleague over a lunch, he discovered that parts of the knowledge they had would be very beneficial to his operations and for his teammates.

Vignette 1c – PABX Annual Convention

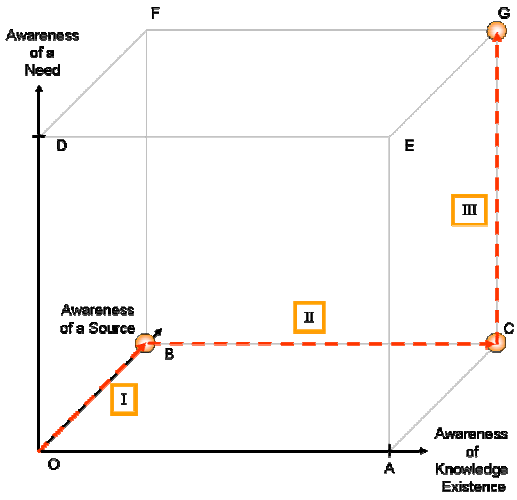


I] State "O" to state "B": The salesmen of the small-business PABX team participate in the PABX convention. They meet many technicians and employees of the PABX business.

II] State "B" to state "C": From their chatting with technicians, the salesman team comes to know about the existence of a document in which the average installation times of a variety of PABX equipment is recorded.

III] State "C" to state "G": At the next weekly review of operations, the salesman team realizes the need to acquire the mentioned piece of knowledge possessed by technicians in order to give clients better estimates of PABX implementation dates.

Vignette 1e – Transfer of a salesman across departments

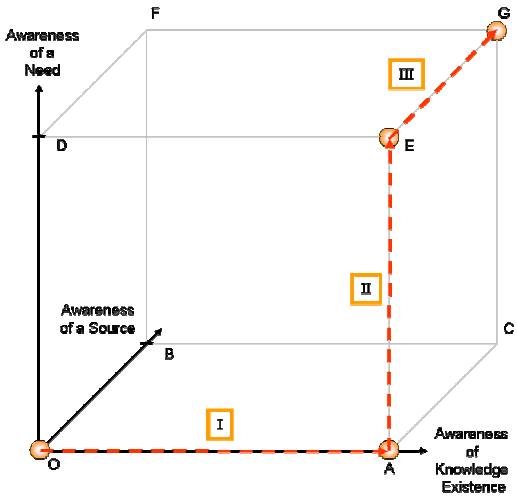


I] State "O" to state "B": Mr. Gilman asked to be transferred for one month from the PABX small-business division to the PABX enterprise division. During his stay in his new environment, he meets and gets acquainted with various individuals.

II] State "B" to state "C": Mr. Gilman learns from his work and new colleagues about the rapid development of integrated solutions comprehending wifi and VoIP technologies.

III] State "C" to state "G": After Mr. Gilman has joined back his former team, a meeting with his manager yields a shared understanding that more knowledge on new technologies are needed to prepare the future and that sharing knowledge with the PABX enterprise team would be beneficial in this regard.

Vignette 1f – Crash program experiment



I] State "O" to state "A": Mr. Poiset learns about the existence of a crash program being experimented in the south-east region from the PABX newsletter he receives monthly.

II] State "A" to state "E": Mr. Poiset appraise the interest of such a program and realizes that the learning resulting from such an experiment could be helpful to his business.

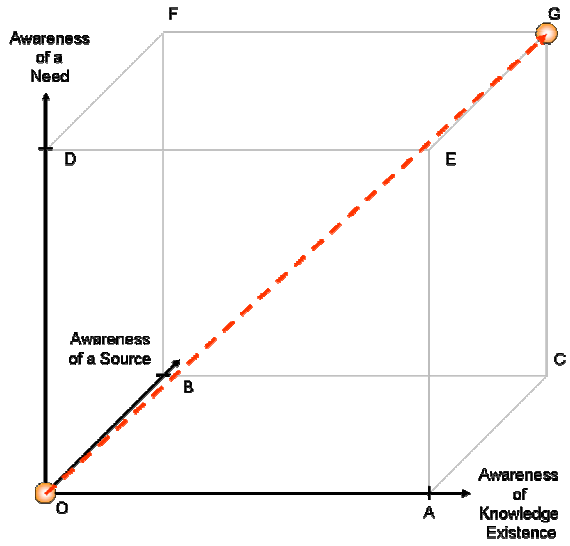
III] State "E" to state "G": Mr. Poiset calls the FRANCE TELECOM Group corporate department. He inquires the PABX newsletter editing team about the best person to contact in order to know more about the crash program experiment. The contact information of Mr. Falson is given to him.

4.3.6. Development of awareness: 4 different loci of search

The previous section showed that in the 6 vignettes, the path which leads from non-awareness to total awareness can happen in various ways. Sometimes, it starts with the analytical definition of a problem and the awareness that a lack of knowledge exists in this area (vignette 1a, vignette 1d). Some other time, it is the serendipitous discovery of a piece of knowledge

that makes one realize a certain need (vignette 1b, vignette 1f). In some other cases, it is the awareness of a new source of knowledge which results in the discovery of an unknown piece of knowledge or need (vignette 1c, vignette 1e).

Of course, in some situations, the awareness development process is much simpler. It is not uncommon to have cases where one bumps into a new colleague as he or she walks around the offices and discovers in the same time from this person, the existence of a piece of knowledge, a source ready to transfer it, and the need for it. This case can be visualized as a straight path from state "O" to state "G".



At this stage of the data analysis and conceptualization work, the idea is not to look at the possible patterns that may emerge when considering the different paths, straight or less straight, and that lead an individual to stage "G" where knowledge transfer can be considered. Instead, this section raises the question of understanding better how an individual moves from a certain state of awareness to another.

The first observation that can be made is that the move from an awareness state to another happens, in all our vignettes, according to two different scenarios. In some cases, it is the **active search** by an individual to develop his or her awareness that results at the end in the development of certain type of awareness. This situation can be illustrated by vignette 1c where all organization members participate in the annual convention event with the intention of actively developing their awareness about the sources that exist and the knowledge which

resides within their company. In some other cases, the development of awareness is the outcome of a non active search and can be viewed as the result of a **passive search**. The individual is not actively looking for something. He or she does not actively seek something, but happens to know it, just by chance. An instance of this case is vignette 1b where Mr. Smith gets to know about the existence of an interesting piece of knowledge just by chance, without having engaged in any active search behavior.

The second observation which also relates to the context in which individuals develop their awareness is that the search, active or passive, can be **directed** or **undirected**. By directed or undirected, it is meant that the object of a search can be more or less known by the individual. In vignette 1b for instance, Mr. Smith has found the existence of an interesting piece of knowledge via the discovery of a report residing on the file sharing server. This search, in addition of being passive (Mr. Smith was not actively looking for something), was an undirected open-ended search. Mr. Smith had no direction, no area of interest, no object in mind to search for. At the opposite, after he had discovered the existence of this piece of knowledge and had realized its importance, Mr. Smith engaged in a search for something very precise. He was looking for the location of the full knowledge relating to the document he found, namely, its source, the author of the document, and an access to this source. The search was certainly directed or close-ended.

Those two observations suggest the existence of two dimensions that describe the locus of mind of individuals as they develop their awareness. The first dimension is about the degree of activeness in the search for awareness development. If this dimension is considered as a continuum of different states, the extreme values are total passiveness in one end and total activeness in the other end. The second dimension describes the extent of directedness of the search, meaning how clear is the object of search that the individual is looking for.

The consideration of those two dimensions ("search activeness" and "search directedness") with two broad values ("low" and "high") highlights the existence of four basic loci of search context. The reality suggests a continuum of states rather than four entirely distinct and over simplistic cases. However, the discussion of those four cases may yield fruitful results for both researchers and practitioners (see Figure 24).

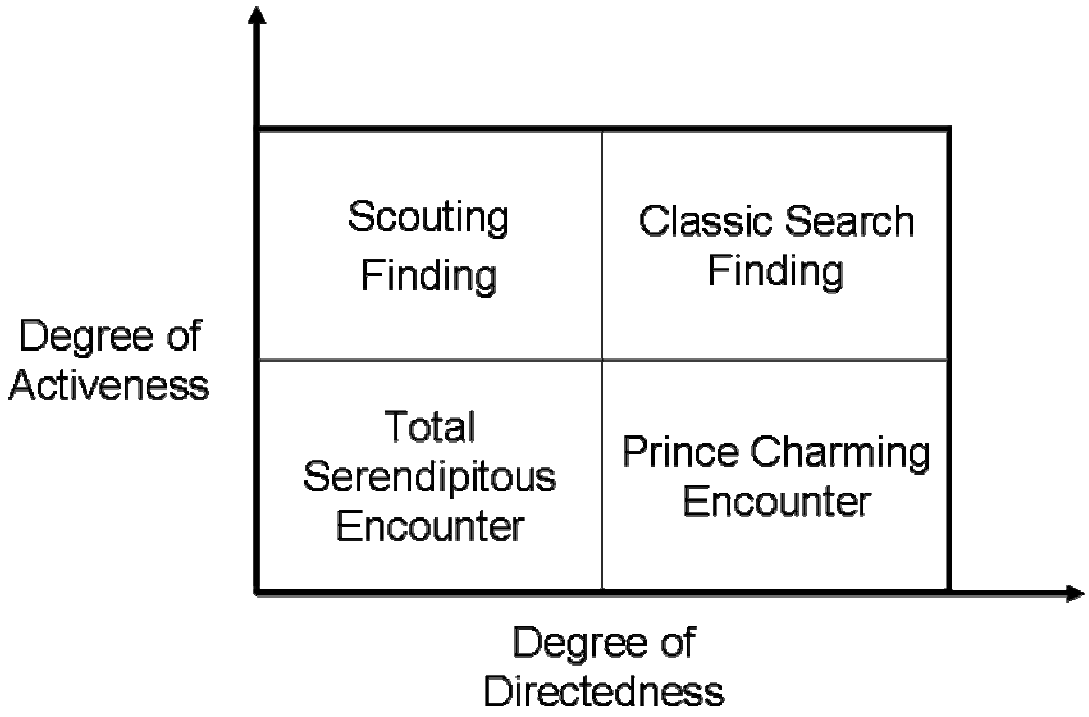


Figure 24 - 4 contrasting Loci of Search

The upper-right quartile of Figure 24 is named **classic search finding**. This term refers to a finding that results from an active and directed search. In other words, in this context, the individual increases his or her awareness after having actively searched a certain piece of knowledge. One example is given in vignette 1b as Mr. Smith developed his awareness of a source after having actively sought the author of the promising document he had found by chance previously. Vignette 1a offers another illustration of what is called *classic search finding* as the team from Belleville has been actively looking for, and has found, a pertinent solution to the problem they have identified.

The upper-left quartile of Figure 24 is named **scouting finding**. It refers to the locus of search in which the development of awareness is the fruit of an active but undirected search. Put differently, it denotes the case where an individual increases his or her awareness after having engaged in active search but with no precise ideas on the object of the search. While spending time and efforts *scouting* around, the individual is open to any encounter. This locus of search is instantiated in vignette 1c where organization members allocate a full day to meeting people and exchanging ideas at the annual PABX convention.

The two previous quartiles were concerned with a context of active search. Less intuitively, the two next quartiles tackle the cases in which awareness is developed with no active search engaged.

The lower-right quartile, named **prince charming encounter**, refers to the scenario in which the finding of a piece of knowledge occurs while the search is passive but directed. This concept of a passive but directed search can seem counter-intuitive at a first glance. The questions which may be raised are ‘What does “passive search” means?’, ‘Can it still be called “search” if the individual is not really searching?’. What is meant here is that the passiveness of the search describes the non-allocation of time and effort in searching while the directedness signifies that the individual is well aware of what should be sought after. As an exotic reference, this locus of search can be likened to some classic fairy tales in which a young princess definitively knows that she is looking for a certain prince but does not spend any effort to actually chase him down. Instead, the young girl keeps her wish well-in-mind and, one day, after some adventures, prince charming opens the door of her room to propose her. Similarly, in vignette 1b, while Mr. Smith is well-aware of the pressure on him to improve the performance of his center via the identification of important business needs, his encounter with a financial document that leaded him on the way to identify a critical need happened incidentally as he was sorting out some paperwork residing on the file sharing server. By no means, he was actively searching a need with his team, in a brainstorming

session for instance. The object of the search was clearly defined but, in this case, the finding occurred without having any active search been engaged.

Last, the lower-left quartile, named **serendipitous encounter**, refers to the context in which a finding occurs while no active neither directed search is conducted. The finding is entirely the fruit of serendipity. One learns about an interesting piece of knowledge while he did not spend any time searching or was not even searching something in particular. This scenario is instantiated in vignette 1d where Mr. Baumet realized from a complaint he had from a client he was working for that a need for knowledge about PABX integration with client's equipments was strong. Mr. Baumet was not looking for anything in particular and was not even in a searching activity when the awareness of a need was given by the client.

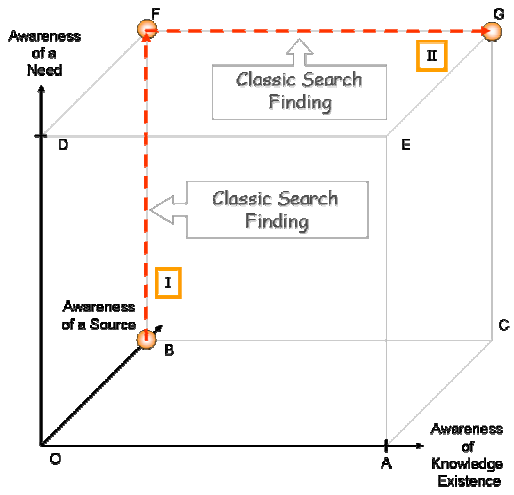
To summarize, the 6 vignettes presented previously have given a detailed insight on the awareness stage, the stage during which individual awareness is built. The study of the different situations in which a move from an awareness state to another occurred has revealed 4 broad types of awareness development contexts, what we call *locus of search*.

PROPOSITION 2: *Activeness of the search* and *directedness of the search* are the two important dimensions that explain how awareness is developed by organization members. Awareness can originate from a "classic-search" locus, a "scouting-search" locus, a "prince-charming" locus or a "serendipitous-encounter" locus of search.

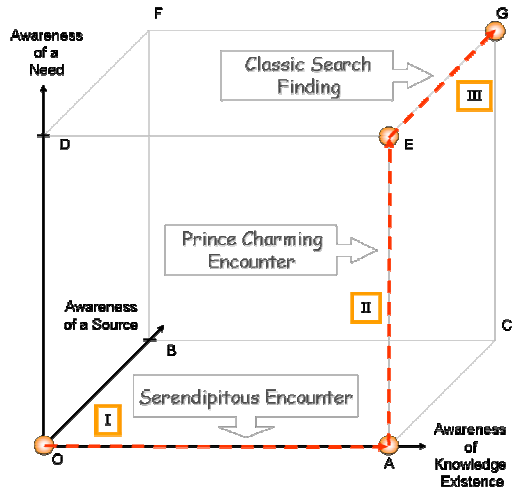
This section was constrained to the study of a unique move from an awareness state to another. It did not take into consideration in an integrated perspective all the different moves that constitute a path from non-awareness to full-awareness (see the 3-dimensional view of a awareness development path). The following section attempts an expansion of the scope of study to this more complete perspective.

4.3.7. Paths to complete awareness and loci of search

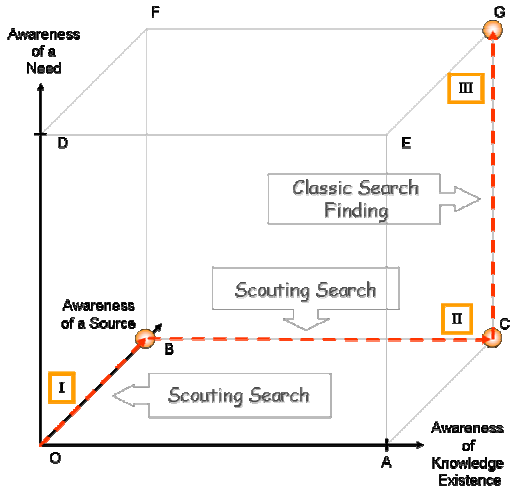
In the previous section, it was argued that the development of awareness happens while individuals present different loci of search. The move from an awareness state to another can be the outcome of different approaches. The search conducted by an individual intending to develop his or her individual awareness can be active-directed (classic search finding), active-undirected (scouting finding), passive-directed (prince-charming encounter), or last, passive-undirected (serendipitous encounter). Whereas the previous section discussed the different categorizations on the base of a single move from an awareness state to another, this section is concerned with the study of the different loci of mind throughout the whole path, from non-awareness to complete awareness. Reusing the 3-dimensional representation introduced in section 4.3.5, the results presented in Table 22 are obtained. Appendix B encompasses the justifications that underpin the locus-of-search categorizations for each move from a state to another.



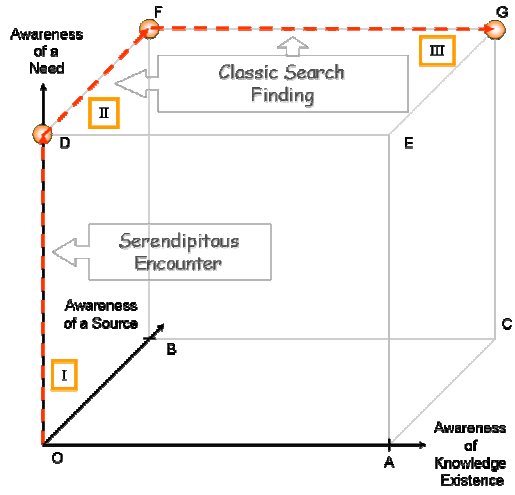
Vignette 1a



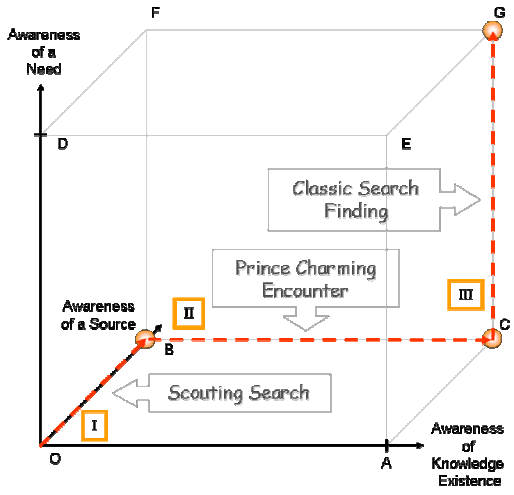
Vignette 1b



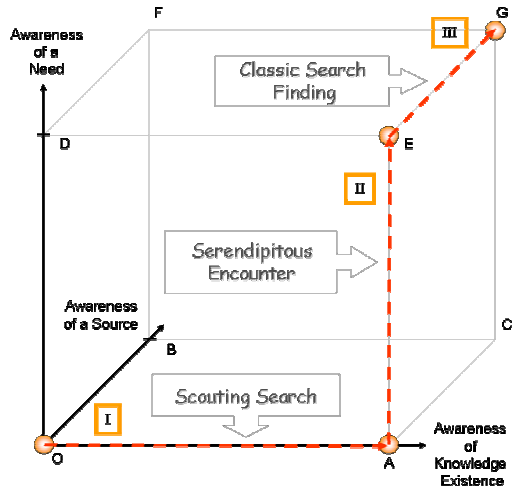
Vignette 1c



Vignette 1d



Vignette 1e



Vignette 1f

Table 22 - 3D awareness development paths and loci of search

The first remark, derived from the results above, is that most of the paths found in the vignettes, from incomplete awareness to complete awareness, make use of a combination of loci of search. For instance, before reaching complete awareness, Mr. Smith (vignette 1b) will move from an awareness state to another through a consecutive serendipitous encounter, prince charming encounter, and classic search finding. There is no unique path, or well-a defined set of paths, that explains how an individual build up his or her awareness.

Secondly, it does not appear with sufficient support that any locus of search would have better performance in driving an individual to increased awareness. One may intuitively defend that, while more costly in resources, the classic search approach is probably more inclined to produce results in a swifter and more predicable manner than the serendipitous approach could be. However, nothing guarantees that the awareness obtained will be of similar value depending on the locus of search they come from. In our case, the small number of vignettes and the modest quantity of data they comprehend do not constitute an acceptable base from which unquestionable hypotheses can be derived. Therefore, it is thought that researching some eventual patterns in the combination of loci of search may prove more fruitful than trying to compare the complex effectiveness/efficiency of the different individual strategies.

As a third point, it is noticed that a recurring pattern seems to emerge while considering the successive move from an awareness state to another in the 6 vignettes of this main section. Indeed, whereas the vignettes show various ways to initiate the development of awareness, at the end, for all our cases, the final move to total awareness is performed in a “classic search finding” context (see Table 23).

Vignette	Awareness Development Paths and Loci of Search
1a.	$B\begin{pmatrix}0\\1\\0\end{pmatrix} \xrightarrow{Classic\ Search\ Finding} F\begin{pmatrix}0\\1\\1\end{pmatrix} \xrightarrow{Classic\ Search\ Finding} G\begin{pmatrix}1\\1\\1\end{pmatrix}$
1b.	$O\begin{pmatrix}0\\0\\0\end{pmatrix} \xrightarrow{Serendipitous\ Encounter} A\begin{pmatrix}1\\0\\0\end{pmatrix} \xrightarrow{Prince\ Charming\ Encounter} E\begin{pmatrix}1\\0\\1\end{pmatrix} \xrightarrow{Classic\ Search\ Finding} G\begin{pmatrix}1\\1\\1\end{pmatrix}$
1c.	$O\begin{pmatrix}0\\0\\0\end{pmatrix} \xrightarrow{Scouting\ Search} B\begin{pmatrix}0\\1\\0\end{pmatrix} \xrightarrow{Scouting\ Search} F\begin{pmatrix}1\\1\\0\end{pmatrix} \xrightarrow{Classic\ Search\ Finding} G\begin{pmatrix}1\\1\\1\end{pmatrix}$
1d.	$O\begin{pmatrix}0\\0\\0\end{pmatrix} \xrightarrow{Serendipitous\ Encounter} D\begin{pmatrix}0\\0\\1\end{pmatrix} \xrightarrow{Classic\ Search\ Finding} F\begin{pmatrix}0\\1\\1\end{pmatrix} \xrightarrow{Classic\ Search\ Finding} G\begin{pmatrix}1\\1\\1\end{pmatrix}$
1e.	$O\begin{pmatrix}0\\0\\0\end{pmatrix} \xrightarrow{Scouting\ Search} B\begin{pmatrix}0\\1\\0\end{pmatrix} \xrightarrow{Prince\ Charming\ Encounter} C\begin{pmatrix}1\\1\\0\end{pmatrix} \xrightarrow{Classic\ Search\ Finding} G\begin{pmatrix}1\\1\\1\end{pmatrix}$
1f.	$O\begin{pmatrix}0\\0\\0\end{pmatrix} \xrightarrow{Scouting\ Search} A\begin{pmatrix}1\\0\\0\end{pmatrix} \xrightarrow{Serendipitous\ Encounter} E\begin{pmatrix}1\\0\\1\end{pmatrix} \xrightarrow{Classic\ Search\ Finding} G\begin{pmatrix}1\\1\\1\end{pmatrix}$

Table 23 - Awareness Development Paths and Loci of Search

To explain this view simplistically, it is as if organizational members start building their awareness using any of the four loci of search, and then, once a few of the awareness types are obtained, the trend is to reach complete awareness via the classic-search-type locus of search. In our study, vignettes 1b and 1d start with a serendipitous encounter, vignettes 1c, 1e and 1f start with a scouting finding and vignette 1a starts with a classic search finding. But all of them are finished by a final move performed via a classic-search locus.

This remark raises the question of discovering an eventual common dynamic in the way locus of search are used throughout the individual awareness development process. The following paragraph tentatively proposes to root out the plausible causes underlying the suspected pattern.

A hypothesis we may want to advance here to explain the recurrence of a similar pattern is that the obtention of a first piece of awareness (via any of the possible loci of search) acts like

a trigger and influences the use of a certain locus of search for the next move of awareness state. The development of each type of awareness has an effect on the development of the other types. For instance, the serendipitous encounter of an interesting document by Mr. Smith made him aware of a certain piece of knowledge existing within his installation/maintenance center, and what is more, made him aware of a particular need, perceived as important to improve his division's performance. This newly-acquired awareness of a piece of knowledge and of the need for it (from a serendipitous and prince charming encounter) triggered an active and directed search for a source ready to transfer it. It seems, at least in our vignettes, that the closer an individual is from complete awareness, the more likely he or she is able to engage in an active-directed search for the missing awareness.

Proposition 3: The closer is an individual to complete awareness, the more likely he or she is to adopt an active-directed locus of search ("classic-search" locus).

Having discovered a need or a piece of knowledge or a new knowledge source is found to give organization members the will and capabilities to engage in an active and directed search. The activeness of the search seems to be determined by the will to know more, the perceived interest in developing his or her own awareness. The directedness of the search seems to be determined by the capability of the individual to know in what direction he or she envisions finding interesting awareness. The more awareness or knowledge an organization member has, the more likely he or she may be to perceive the interest of a certain type of awareness and the more likely he will have the capability to envision a direction of his or her search. This simple argument was drawn from the interviews from which the vignettes were obtained and may offer an intuitive explanation for the recurrent reach of complete awareness via a "classic search finding" in the final stage of awareness development.

4.3.8. A snowball process in the awareness development process

The previous section pointed out, after further examination of the cases, that whereas the awareness development paths of our vignettes started in any of the four identified locus of search, they all finished by a classic search finding. It was suggested that this recurrent pattern could be explained by the argument that once a certain type of awareness is developed, an individual is more likely to update his or her perception of the interest for further developing his or her awareness in the other types, and what is more, he or she will have more clues about the most promising search directions to consider. Therefore, the *classic search* locus becomes more and more possible, eventually desirable, as the different types of awareness are developed.

In another area, and taking a global perspective, this assumption has also some interesting implications regarding the common development of the different awareness. Indeed, it was noticed that a relationship is often found between the "global level" of the three types of awareness. By "global level", it is meant the degree of general awareness, the consolidated awareness of a certain type, and not the piece of awareness required for a single knowledge transfer as considered in the previous chapters. An example may help clarify this argument. It has been felt during the interviews and from observations that, often, employees have fairly homogeneous levels of awareness. For instance, the business process coordinator we interviewed, also referred to as a knowledge broker, described himself and was described by his peers as being very well aware of the many knowledge sources one may reach within the organization, very well aware of the pieces of knowledge residing in the firm and as well, very well aware of the needs that may require to be addressed.

The hypothesis that different types of awareness have an effect on the development of each other (see section 4.3.7) underpins the argument according to which individuals tend to have homogeneous levels of awareness. In other words, an individual who has a high level of

awareness of one type will tend to develop in a more favorable manner the other types of awareness. An organization member globally well-aware of his knowledge needs will tend to find new knowledge sources and to develop his or her awareness of the knowledge available around him or her. Some promising implications can be derived from this hypothesis and will be discussed later on.

4.3.9. Summarizing conclusion

Before moving forward and leaving this section on awareness, it may prove useful for clarity to summarize the findings that have been presented in the above paragraphs. First, a set of 6 vignettes describing different knowledge sharing events have suggested the existence of three main types of awareness required before any individual can engage in a formal knowledge transfer. In addition of being **aware of the existence of a piece of knowledge**, the **awareness of a source** ready to deliver it and the **awareness of a need** for this piece of knowledge are as much needed. Second, the identification of those three types of awareness has given way to a new perspective when considering the vignettes. It was noticed that, before the three types of awareness are obtained and before a knowledge transfer can occur, the development of awareness can follow different paths. Sometimes, it starts with the identification of a need, sometimes it is the encounter of an unknown source or some other times, it is the discovery of a piece of knowledge that leads, one way or another, to the development of the three types of awareness. Sometimes, it happens all in once. A 3-dimensional representation was used to plot the different paths that can be taken by individuals who move from an incomplete awareness state to a final and complete awareness state. Third, it was observed that the move from an awareness state to another happened in different contexts, in different configurations. While, on some occasions, the development of awareness was the fruit of an active and directed search, it emerged that sometimes, a finding occurred just thanks to a serendipitous encounter, from a passive and undirected search. Activeness (versus passiveness) and

directedness (versus undirectedness) are the two dimensions used to describe the loci of search which lead individuals to develop the different types of awareness. Four loci were therefore named and discussed in further details. Fourth, studying the evolution in the use of the different loci of search throughout the 6 awareness development paths, it was found that a recurring pattern was common to the six vignettes. Whereas the first move from an awareness state to another happened in any of the 4 loci of search, the last move to complete awareness was always a classic search finding, in other word, the fruit of an active-directed search. It is proposed as a tentative argument that the obtention of a certain type of awareness is often the trigger which allows an individual to develop a will and vision to engage in an active-directed search. Last, and fifth, extending on this assumption of a dynamic evolution on the search throughout the awareness development path, we argue that individuals tend in a favorable context to develop comparable levels of global awareness for each type.

4.4. KNOWLEDGE SHARING MECHANISMS

4.4.1. Introduction

The previous section on awareness has placed the perspective at an individual level. The following considers a network level or an organizational level. The point here is not to improve knowledge sharing for a single individual but to improve knowledge sharing thoughtfully in a company or a business unit. The knowledge sharing mechanisms in place in a company are an important element that influences the intensity and quality of knowledge sharing. It does not explain everything (does not cover for instance motivational factors) but is critical to bridge islands of knowledge (Chai, 2003).

The definition of the term “knowledge sharing mechanism” is not carved in stone. Chai (2000) proposes to define it as “any structured, management-supported practice that allows knowledge-transfer between participating organization members”. The important point

stressed in this definition is that a knowledge sharing mechanism has to be a structured practice. It is not something that happens totally by chance only once. It has to be consistent in the time and has to be somehow supported by management. To know better about what kind of mechanisms exist in firms and what characteristics may prove important, the following exposes further the case with FRANCE TELECOM Group.

4.4.2. Example of Knowledge Sharing Mechanisms encountered in FRANCE TELECOM

To introduce this section on knowledge sharing mechanisms and on their relationship with the awareness development process, a non-exhaustive review of the mechanisms encountered during our stay in FRANCE TELECOM is given at the end of this section. This list gives corroborating evidence that the notion of "knowledge sharing mechanism" is a loose concept and includes a broad range of instantiations. Most of the interviewees have asked during the data collection phase what exactly was meant by the term "knowledge sharing mechanism". For instance, the questions often raised were "Do you mean an ICT tool?", "Are you referring to a medium like phone, email, or visio-conference?", "Would you consider a weekly meeting practice as a knowledge sharing mechanism?". The working definition used for the interviews was: "the term of knowledge sharing mechanism refers to any organizational practice in which some pieces of knowledge are shared among participants". The underlying idea was that a sharing mechanism has to be somehow recurrent, perennial, something that occurs at different occasions and which ends up in some knowledge being shared among the people involved.

The list of knowledge sharing mechanisms that was laid during the data collection stage suggested two broad categories. Some knowledge sharing mechanisms were for the most part based on **technologies** (e.g. email, knowledge database, or wireless connection), while some others had their underpinnings largely rooted in **management** practices and people issues

(e.g. experience review or project briefing). This distinction is fairly artificial. Even the most technology-oriented mechanisms include some part of management references (for example, some non-explicit rules concerning the way to write and send emails exist), and conversely, even the most management-oriented mechanisms include to some degree a technological flavor (for instance, the experience review mechanism requires a projector, a white-board, pens). Positioned in a middle-place in the spectrum between technology and management, tele-training, skill mapping, or application sharing are some examples where the management and technological aspects are of comparable importance.

Very often, knowledge sharing mechanisms are described only by their technological component or by their management component. Reducing the definition of a knowledge sharing mechanism to only one of those two constituents dichotomizes the perception one can have about a knowledge sharing mechanism. It makes it difficult for individuals and managers to consider on a same ground a knowledge database mechanism and a project briefing mechanism.

We argue that it would be more exact and fruitful to consider technological orientation or management orientation as two dimensions referring to two continuums of states rather than to two clear-cut categories (see Figure 25). A mechanism may take advantage of a technology that exhibits more or less sophistication. It can range for instance from a simple “pen/paperboard system” to an “integrated multi-dimensional corporate database”. In the same time, different mechanisms call for different levels of management and people complexity. The management issues and problems brought forth by a mentoring relationship or by the management of an annual convention do not require the same amount of effort. The purpose here is not to suggest two dimensions on which the knowledge mechanisms we encountered would be plotted with objectivity and precision but rather to emphasize two contrasting dimensions that oppose, for example, a “knowledge database” mechanism to an “experience review” mechanism.

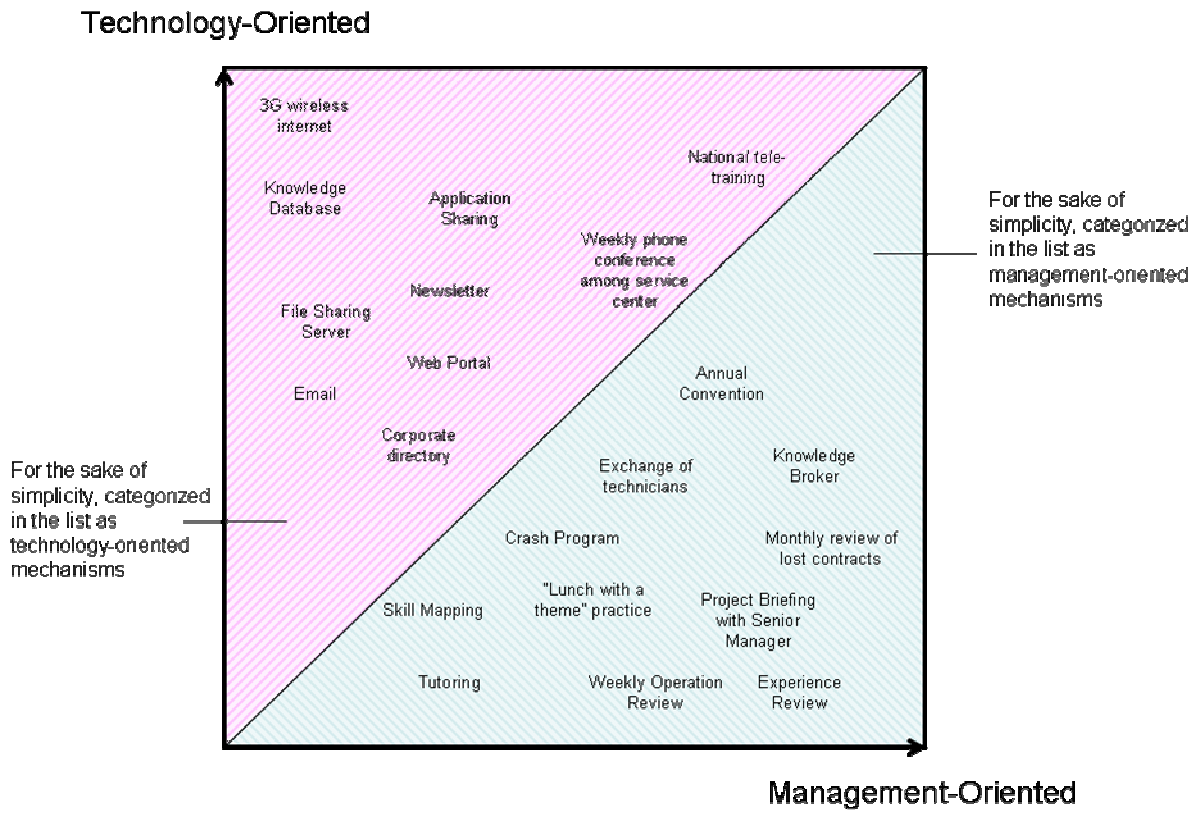


Figure 25 - Technology Vs. Management Oriented Mechanisms

Consequently, for the sake of clarity, the list hereafter follows this two-choice categorization and encompasses on the first hand what could be called “technology-oriented mechanisms” before tackling, on the second hand, “management-oriented mechanisms” (see Figure 25). Obviously, FRANCE TELECOM uses way many more mechanisms that what is given above. The mechanisms which are presented in this section have been selected because they were either observed first-hand, either recurrently talked about when the question “what mechanisms do you or your team use to share, acquire or diffuse knowledge within your company?” was raised (see Appendix A).

Examples of Technology-oriented Knowledge Sharing Mechanisms

- **2a. Email** -The most famous and most used among them all, email can be considered as a mechanism used to share knowledge. In FRANCE TELECOM, with no surprise, all employees are connected via email and exchange all sort of knowledge using this media.

Meeting minutes, sales figures, customer complaints, technical specifications are diffused via this channel and knowledge is shared through this mechanism. The degree of use varies depending on the person, the job title, etc... Some organization members receive more than 100 emails a day while some others are quieter and favor other mechanisms.

- **2b. Weekly phone conference among installation center** – As the organization and the processes are still new for FRANCE TELECOM PABX division, a practice of having weekly phone conferences among the installation department people has been implemented in the region I have studied. Technicians from 5 different installation centers attends every week a phone meeting where the problems that have appeared during the week are discussed and solutions are proposed.

- **2c. Knowledge Database** – A large diversity of PABX products and brands have to be installed and maintained by FRANCE TELECOM. For technicians, knowledge is a key element and they need to update it at a challenging pace. A way to share knowledge between experts and technicians has been to create a knowledge database in which interesting questions raised by technicians are answered by experts and published online. The database is available nationally to all technicians from any internet-connected computer. Experts get their knowledge from their specialization in a brand and set of products. In top of that, they have access to high-level expertise knowledge from their privileged and direct relationship with PABX equipment manufacturers.

- **2d. Web Portal** - The PABX business has a national scope. In order to share with others the adventures that happen at different places, a web portal is accessible on the internet to FRANCE TELECOM PABX division's employees. The web portal offers business news, tips and advices, and links to other resources. The knowledge given here is fairly general and does not really target any specific activities of the PABX business.

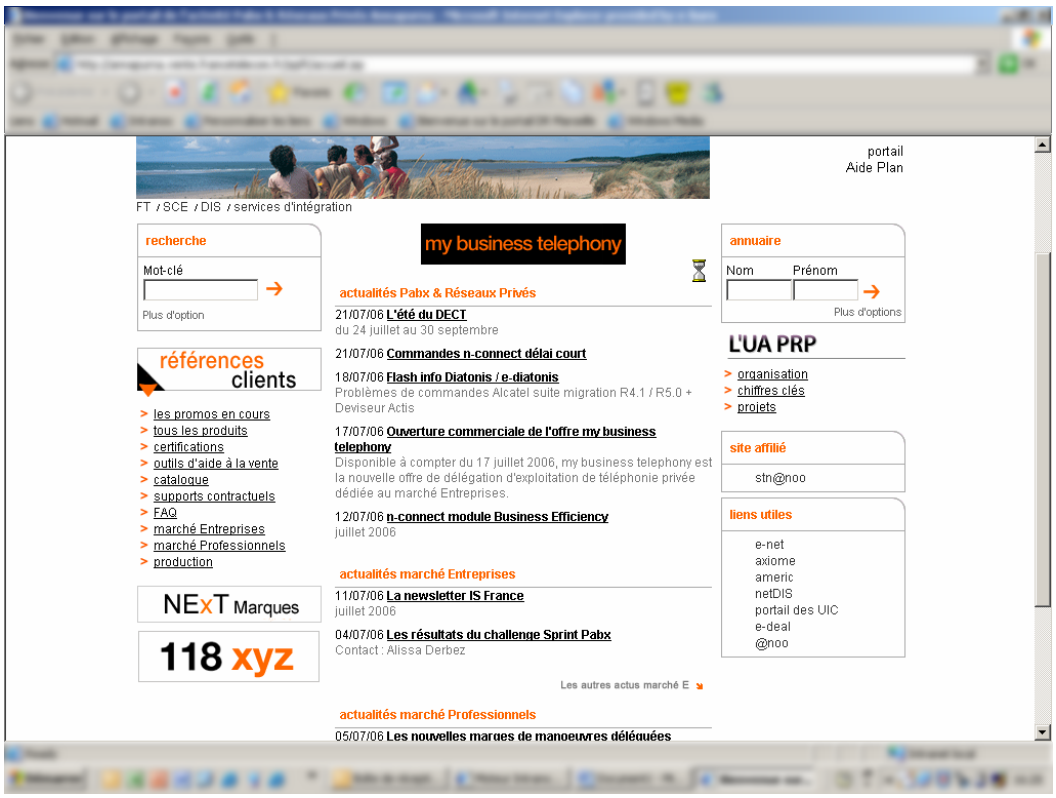


Figure 26 - Screenshot of the PABX Webportal

- **2e. Newsletters** - Technicians and sales representatives receive different kinds of newsletters. For the large part, they are written for middle or top managers and most of them are edited and diffused nationally by a functional team of the corporate headquarters. Those newsletters cover disparate domains and gather the latest innovative success stories, best identified practices, critical technical information, etc…

- **2f. File sharing server** - A very common knowledge sharing mechanism is the possibility for employees to store and share files with other on a file sharing server. In contrast to the national scope illustrated by the web portal or newsletter mechanisms, the file sharing technology is available in all departments and units but are implemented in a local setting. Teams of all sizes have their own file-sharing server on which important project files or business documents are kept available to all team members.

- **2g. Application sharing** - Complementing the phone conference, it is possible for employees to share an application using computers connected to the company's network. For instance, a PowerPoint can be presented over the phone to a group of people working

at different places. Each of them can see the slides on their computer screen and discuss the issues using their phone. This practice is widely spread and used by employees within the group.

- **2h. 3G-wireless laptop internet connection** - It is now possible to get access to Internet from anywhere using a special card that allow you to connect your laptop to the 3G network and then to the internet. FRANCE TELECOM PABX division has started offering this technology to its employees, mainly sales representatives at this time.

- **2i. National tele-training** - A new form of training has appeared in FRANCE TELECOM. For example, many technicians need to be regularly trained on the new products that are sold and maintained, or commercials need to follow a new procedure when entering their orders in a new information system. Instead of sending teams of trainers in all the different regions, it is now possible to perform the training directly with a visio-conference, following the instructions and practicing directly using computers connected together through the company's private network.

- **2j. PABX yellow pages** – as it is the case in most large firms, a corporate directory is available to anyone having an access to the company's intranet. It gathers the contact information and job description of every member of the PABX division.

Figure 27 - Example of card from PABX yellow pages

Management-oriented Knowledge Sharing Mechanisms

- **2k. Tutoring** – Aimed at facilitating knowledge sharing among technicians, a well spread knowledge sharing mechanism used by FRANCE TELECOM is the institutionalization of tutoring. Young employees are assigned tutors who will be in charge of sharing their knowledge and answer any of the questions they receive.

- **2l. Experience review** - Part of the corporate culture of FRANCE TELECOM is the recurring usage of project review as a mean to solve cross-functional issues. It also aims at improving the learning that can be drawn from the peculiar experiences that show up along the way. So, when something goes terribly wrong or dramatically well, it often comes that the actors involved in the story decide to meet and try to understand together around a table why it ended up with such an outcome.

- **2m. Project briefing with Senior Manager** – It was found that among FRANCE TELECOM teams, it is not uncommon for organization members to ask seniors or more experienced people to review a project which is launched or which has been launched recently. For instance, while a new commercial procedure was tried out in order to improve the measurement of customer satisfaction, the project was presented to people from outside the department. Offering an unbiased and fresh perspective, their feedback and advice were attentively listened to.

- **2n. Weekly operation review within each PABX installation/maintenance center** – As part of a “lean management program” initiative being implemented in the PABX division, a meeting with specific objectives is hold every Friday in each PABX installation/maintenance center. It gathers PABX technicians and their team manager. The purpose of those meetings is to have technicians expose the problems they have faced during the week and discuss the solutions that have been tried out to address them. In a way, it prepares and facilitates the weekly phone conference that brings together the 5 installation centers weekly.

- **2o. Annual convention** - Another type of mechanism is the use of informal events in which an unconventional setting fosters the sharing of a certain type of knowledge among employees of different departments. In the region where this study was conducted, the management of the PABX division organizes every year a PABX convention where sales representatives, technicians and managers all meet and discuss their respective issues during a entire dedicated day. Nearly 300 persons have met this year.

- **2p. Crash program** – The management team of the region to which this study was constrained has implemented this year an innovative and bold program that gives the opportunity (among other things) for technicians to spend one full day following a sales representative in his or her day-to-day job. Technicians go along with commercials to visit customers, design an offer, negotiate an estimate, enter an order in the system and so on.

- **2q. Skill mapping** - The skills and knowledge required to install and maintain PABX equipments are an important asset for FRANCE TELECOM. In order to find the right person for the right job and manage better how knowledge is shared, a mapping of the skills and knowledge of all technician is regularly updated and analyzed. Certifications are given for some products and brands. This practice allows technicians or managers to find swiftly another skilled technician as pieces of knowledge are required.

- **2r. Exchange of technicians among regions** - Aimed at facilitating knowledge sharing among regions, a well-spread practice, in the FRANCE TELECOM PABX division, is the willingness of management to “lend their technicians” and allow them to participate in another region where their knowledge is missing and required. Indeed, a unique technician cannot reasonably have all the necessary knowledge on all the products of all the brands. As a result, knowledge and skills has to be carefully managed. When a region is missing certain knowledge, it is common to ask a technician from another region to come and do the work there. In the same time, knowledge can be transferred from traveling technicians to local technicians.

- **2s. Monthly review of lost contracts by sales departments with invitation of technicians** – This practice has been implemented in the PABX enterprise sales team. It refers to the review by salesmen and two invited technicians (in average) of the contracts that have been lost recently. The meeting takes place on a monthly basis. The purpose is to unveil and highlight the reasons that led to the rejection of certain offers. Technicians often offer much appreciated remarks and advice touching on the technical aspects of the offers and the cost/delivery issues it raises.

- **2t. Creation of a knowledge broker position** – The PABX organization structure is young. Employees have to get acquainted with many newly-created departments and unmet colleagues. The creation of a knowledge broker position was created in order to help organization members find solutions to their problems and discover the appropriate persons. The knowledge broker visits the various installation centers and sales teams with the objective of solving cross-department and cross-function issues in a reactive fashion.

- **2u. Exchange of technicians between France and Poland** – This knowledge sharing mechanism has not been implemented yet but plans are discussed for starting up soon. The idea is to facilitate and promote short-time exchanges of PABX technicians between France and Poland with the purpose of fostering both cultural and technical knowledge sharing.

- **2v. Theme-lunch with management –** Another mechanism encouraged in the PABX organization is the use of “theme-lunch” or “lunch with a theme”. Basically, it refers to the practice in which a manager and one or several employees meet for lunch with a pre-chosen theme to discuss while eating. Those lunches differ largely from more ‘traditional’ meeting because of the less formal environment and the openness of discussions.

4.4.3. Knowledge Sharing Mechanisms and Management control

The previous subsection has exposed a non-exhaustive list of the popular knowledge sharing mechanisms encountered during our investigation in the FRANCE TELECOM Group. It was argued that every mechanism comprehends a technological dimension as well as a management dimension. This subsection takes interest in the role and options managers have when it comes to design and support those knowledge sharing mechanisms.

Looking back at the knowledge sharing practices currently used in FRANCE TELECOM PABX division, it can be noticed that the degree of control exercised by the management bears on four distinct components: the **technologies** that are used, the **management** practices that are encouraged, the **people** that are involved, and the **knowledge** that is shared.

The control pressed upon each component of a mechanism may vary. Considering 2 extremes of the spectrum, one can take the example of the mechanism “national training of technicians” and “communities of practice”. The former practice is totally controlled by top-management. The knowledge to be transferred is the knowledge relating to the installation of a certain set of products chosen by the management. The people involved are the experts giving their knowledge and technicians in charge of installing those products needing this knowledge. The management practices are constrained to discussion and learning-by-doing. Video-conferencing and computer sharing are the technologies to be used. None of the components of this mechanism is let “free”. In the other hand, the top-management has decided to have very little control on the knowledge sharing mechanism called “community of practice”. Individuals choose to participate or not in the community. Top-management does not give any advice on the management practices to employ, the technology to use, or the knowledge that should be shared.

The distinction between totally-controlled and totally-free practices is not new. It is typically the distinction between top-down knowledge sharing and bottom-up knowledge sharing. The

framework proposed above presents its real contribution in the many cases where a mechanism is partially controlled by management. Coming back to our data, one can take the example of the knowledge database for PABX technicians. In this case, the people involved are well defined. However, their degree of participation is not monitored neither it is required. The knowledge to be shared using this mechanism should be related to PABX installation and maintenance issues but there is no precise control of the content. The only component really supported by top-management is the technological tool, the database itself. The message we intend to give with this notion of control is that a knowledge sharing mechanism can be none at all, partially, or entirely designed and supported by the top management. Top-management has the responsibility of defining the degree of control they think necessary when designing and implementing a knowledge sharing mechanism. This degree of control bears on the 4 constituents, namely the technologies to use, the management practices to follow, the people to be involved, and the knowledge to be shared. This responsibility is also the mean by which top management can act to improve knowledge sharing in an organization. This role of management and knowledge sharing mechanisms on knowledge sharing is introduced in the following section.

4.4.4. Sharing mechanisms: Awareness Development versus Knowledge Transfer

The focal interest of this research obviously relates to the development of awareness by individuals and the influence of knowledge sharing mechanisms on this development. The previous section has highlighted the interest of top-management in considering knowledge sharing mechanisms as means to improve individual awareness among organization members.

We are aware that the influence of knowledge sharing mechanisms is not limited to the development of awareness. By contrast, most researchers in the field of knowledge management have considered the role of knowledge sharing mechanisms in the context of

knowledge transfer. But the development of awareness inherently requires some knowledge being shared about the existence of a piece of knowledge, a knowledge source or a knowledge need.

To illustrate this dual influence of knowledge sharing mechanisms on the two consecutive phases of the knowledge sharing process (see Figure 28), one can consider the weekly operation review mechanism implemented in the PABX installation/maintenance centers (see vignette 2n). A meeting involving most of the technicians of the center is hold each Friday. The objective is to bring the technicians together to review what has happened during the week, to share individual experiences, to learn from the other's mistakes or successes, and identify common problems and issues that need to be addressed. This mechanism is essential to the development of awareness among technicians of the center. On top of that, it is also a mechanism through which complete pieces of knowledge are shared from technicians to technicians.

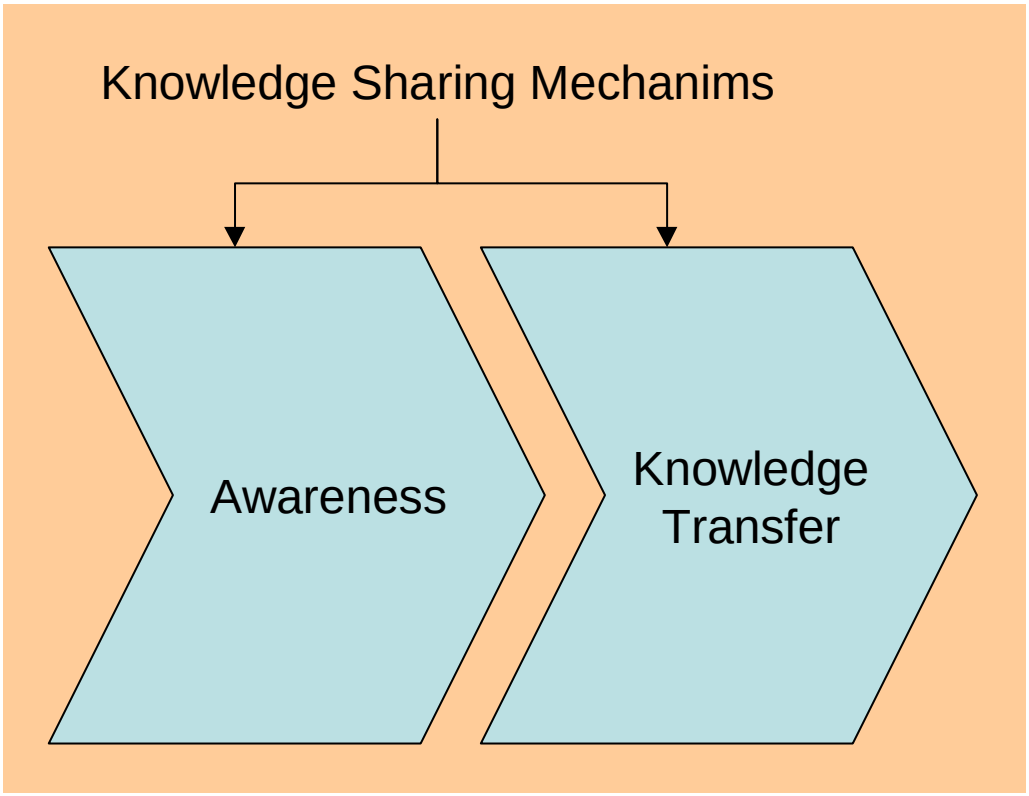


Figure 28 - Knowledge Sharing Mechanisms and the Knowledge Sharing Process

By reviewing each mechanism of the list given previously, it can be inferred that some mechanisms are more likely to influence the awareness development stage than the knowledge transfer stage, and conversely, that some are expected to have a greater impact on helping knowledge be transferred than on creating awareness. For instance, the newsletter mechanism can hardly be viewed as a mechanism that allows a complete and working piece of knowledge to be transferred to a technician. Sending an expert technician to train a group of fellow technicians in a rural area will certainly serve well the objective of transferring important knowledge from the expert to the group, and in the same time, it will probably develop among the group an awareness of knowledge existence or an awareness of knowledge needs.

PROPOSITION 4: The knowledge sharing mechanisms used in organizations affect both the stage "awareness development" and the stage "knowledge transfer", and each mechanism has a different impact depending on the stage which is considered.

While the important role played by knowledge sharing mechanisms in the knowledge transfer stage is well acknowledged, this research constrains its perimeter to the study of the relationship between knowledge sharing mechanisms and individual awareness development. In line with this focused perspective, the following section discusses the impact of certain knowledge sharing mechanisms on the development of the three different types of individual awareness.

4.4.5. Types of awareness and knowledge sharing mechanisms

In order to investigate the relationship between awareness, effective knowledge sharing, and knowledge sharing mechanisms, the managers we interviewed were asked two specific questions.

The first inquiry related to the description of eventual cases in which an employee did not engage satisfactorily enough in knowledge transfer activities, or in other word, cases where one of his or her team members did not use in a satisfactory manner the available knowledge residing around in the organization. The second inquiry bore on the actions taken by management to improve the different situations, especially on the use of knowledge sharing mechanisms, and on the discussion about the influence it had on the development of awareness.

Three cases emerged as salient illustrations of how the lack of a single type of awareness could impede the ability of an individual to identify advantageous knowledge transfers, and on how certain knowledge sharing mechanisms had the inherent capabilities to foster the development of one type or several types of individual awareness.

Using a vignette format, the three cases are presented below.

Vignette 3a: High awareness of knowledge existence, low awareness of sources, and high awareness of needs

Mr. Jobson, a new employee of FRANCE TELECOM PABX division, had recently started to work in the production department. He was, and still is, in charge of designing technical solutions that answer the customer needs pertaining to private phone line systems and integrated PABX solutions. COFRATEL, the company he had worked for before, had been bought by FRANCE TELECOM a few months ago and he had kept his position and job in the new structure. With a clear analytical mind, he has always been well aware of his priorities, his needs, and of the kind of knowledge that could potentially help him. His manager, Mr. Smith, is very active and kept him informed of all the new ideas and trends that emerged in the organization. Notwithstanding this positive context, at this time, Mr. Jobson had serious difficulties in being involved in advantageous knowledge transfers. According to his manager, an introversive nature plus the fact that he had recently integrated a large new firm explained

why he had not developed yet an extensive social network and why he did not sufficiently know the resources available that could have given him the information he needed.

Actions taken by his manager and outcomes: In order to help Mr. Jobson know better the organization, or in our words, to help him develop with more ease and speed his awareness of sources, Mr. Smith has taken actions in different manners. First of all, following a widely spread practice in FRANCE TELECOM GROUP, he formalized explicitly a “privileged-relationship” between Mr. Jobson and Mr. Guilloux, a fellow colleague in a similar team of the center, with many years of experience in the firm. The relationship did not encompass any form of hierarchy or tutor/tutored relationship. Instead, it was more a recognition of an informal management-supported relationship. By explicitly recommending this relationship, Mr. Smith showed that he expected that and would appreciate if Mr. Guilloux spent the required time and effort to help Mr. Jobson get in touch with the key knowledge sources of the organization. Reciprocally, and to a larger extent, miscellaneous knowledge transfers and knowledge sharing between the two individuals were expected and welcomed. The second main initiative taken by Mr. Smith was to train Mr. Jobson on the use of the information system resources dedicated to the search of knowledge and knowledge sources. A short session insisted on the proper and active use of the corporate yellow pages which are available to all on the intranet of the company. Last, Mr. Jobson was kindly advised to make best use of the annual convention event which was to be hold in September. This convention gathers nearly 300 persons from all the various departments of the PABX division in the same region. The results were very satisfactory according to Mr. Smith, the team manager. The combined action of the three mechanisms above is deemed to have allowed Mr. Jobson to very swiftly develop his lacking awareness of the sources available to him. In less than one month, he did not have any particular difficulties finding a source of knowledge that would answer his questions or keep him informed of the latest business developments in the organization.

Vignette 3b: Low awareness of knowledge existence, high awareness of sources, high awareness of needs

Mr. Martio is a PABX technician in charge of repairing down equipments at customers' sites. Mr. Martio has worked for more than 15 years in the group and knows the organization very well. He knows many people within the firm and also knows well all the kind of IT resources that can provide information. The needs to operate the business are as clear as the business itself and Mr. Martio knows what knowledge he has and what knowledge is useful or not to perform better. What has been a serious impediment to him acquiring critical existing knowledge in a satisfactory manner is that he did not know well what knowledge resided in the organization around him. Most of the time, it was only after his manager told him to acquire a certain piece of knowledge from a certain source that Mr. Martio was able to engage in a knowledge transfer activity. This limited knowledge sharing relied exclusively on the manager and resulted in, on one hand, the manager being very often solicited about problems urgently requiring solutions, and, on the other hand, Mr. Martio being frustrated of being in a way "left behind", since he was not able to pro-actively use the advantageous knowledge residing all around him. Mr. Dupuy, his manager, explained that this uncomfortable situation was explained by the geographically ex-centered position of the maintenance center Mr. Martio was working in and it resulted in very little time spent talking and meeting colleagues from other teams in other areas.

Actions taken by management and outcomes: The case of Mr. Martio was not an isolated case and the problem became really significant when the pace of innovation, product turnover, and business volume increased sharply. With the clear objectives of helping his employees keep in touch with the different knowledge residing and evolving around in his organization, Mr. Dupuy enforced and officially recommended the use of certain knowledge sharing mechanisms, though most of them were already available to his team. First, a "grooming" of the newsletter subscriptions was conducted in order to use optimally a limited

but critical set of newsletters. This initiative prevented technicians from being submerged by a never ending flow of emails. It took away the perception that those newsletters should be considered as mere pollution. Beside, the knowledge database system for technicians was reminded to be a powerful tool to solve or discuss the technical problems that emerge recurrently. In addition of this emphasis on the proper use of those tools by management, the exchange of technicians between regions was facilitated and encouraged. Despite the common use of this practice among the different centers of the PABX division, the exchanges are often viewed as costly at a local level since a technician offering his or her expertise to another center does not bring results to his or her own center. However, the knowledge shared while being outside the center has been recognized as highly valuable. Last, the annual convention gathering all the organization members of the PABX division was expected to bring great benefits bearing on the development of the awareness of existing knowledge. The manager of the center, Mr. Depuy, said that notwithstanding the relative ex-centered geographical position of his center, his employees and particularly Mr. Martio, have improved in a significant manner their knowledge sharing activities, and this is mainly explained, according to him, by the recurrent emphasis made on the use of the mechanisms described above.

Vignette 3c: High awareness of knowledge existence, high awareness of sources, and low awareness of needs

Mr. Jones is a sales representative and work in the department dedicated to big accounts like multinational corporations. His objectives do not lack ambitions and his agenda is extremely busy. Because of his job and his inter-personal skills, he knows very well the organization and where to tap into when he needs information. Also, as he spends a lot of time talking to many and various people, he is well aware of the company's practices, of the latest ideas, and of the knowledge spread within the firm. However, it appeared that no time was sufficiently spent thinking about all the knowledge around, about what he and others need

and on how he could use advantageously the knowledge sources he had access to. In other word, and reusing the terminology introduced in the previous section on awareness, Mr. Jones had a high awareness of existing knowledge and sources, but definitively lacked an awareness of needs. His manager, while globally very satisfied with his performance, realized that very little advantageous transfer of knowledge happened between Mr. Jones and his peers despite the high awareness of the salesman about existing knowledge and accesses. For instance, a few bids were lost because some important knowledge about the client's configuration had not been acquired from the prospect team and was therefore not used by the salesman when designing his offer. Mr. Jones was aware of the existence of those pieces of knowledge and was aware of sources among the prospect team that would have offered this knowledge. However, it was the failure in realizing the need for this knowledge that had inhibited an advantageous transfer of knowledge.

Actions taken by management and outcomes: Mr. Fidbel, the manager of the sales team to which Mr. Jones belongs, took a bold range of actions in order to improve the awareness of knowledge needs, both the awareness of Mr. Jones, and also the awareness of the all team. His first initiative was to implement a practice which encompassed the monthly review of every lost contracts of the month and included the participation of one or two PABX technicians. This monthly review bringing around a same table salesmen and technicians have often yielded positive debates during which most important knowledge needs have emerged swiftly. Besides this monthly meeting, a new practice bearing on the large sales projects was launched. Mr. Fibdel forcefully encouraged a practice that consisted in inviting a senior manager of another division and in asking him or her to review and question the sales team on important sales contracts. The neutral and fresh view of the senior manager was expected to raise original and sound questions that require solid answers. Last, the crash program which had been launched in the PABX division had helped the team by cutting the barriers among divisions. Some technicians were invited to spend a full day with a salesman. The greater understanding of the value chain in which Mr. Jones operated and the confrontation with the other departments helped considerably the ambitious salesman

develop his awareness of knowledge needs. His manager, Mr. Fibdel, reported better performance and an increase in knowledge sharing activities.

For the sake of clarity and convenience, the 3 vignettes above are summarized in the table hereafter.

	Awareness of a Source	**Awareness of Knowledge Needs**	**Awareness of Knowledge Existence**	**Outcome**	**Actions taken by management**
Vignette 3a **A new technician discovering a large organization**	LOW – The technician is new in the organization and does not know yet many people inside. Also, he has to get familiar to the IT-related sources of information as the intranet, web portal, etc..	GOOD – a well-focused mind, many years of reflection in the area.	GOOD – from former colleagues of his previous company and from his direct manager.	Low intensity of knowledge sharing due to a difficulty in finding the right person within the organization.	- explicit assignment of a "privileged-relationship" with a senior peer - training and support for the use of corporate yellow pages - participation to the PABX annual convention
Vignette 3b **A technician in a ex-centered rural area**	GOOD – 15 years of work experience with FRANCE TELECOM. Have a large social network and good knowledge of how and where to get information from the IT resources.	GOOD – A lot of years of experience and a good understanding of his own knowledge and need of knowledge.	LOW - because Mr. Martio works in a rural area far from the main towns, he does not have many opportunities to get in touch with his colleagues from other centers and from the HQ.	Low intensity of knowledge sharing. More a passive knowledge sharing where the manager indicates what to share and from where.	- a plan to encourage and better use the available newsletters - emphasis on the technician knowledge database tool - increased use of the "exchange of technicians among centers" mechanism - PABX annual convention

Vignette 3c **A salesman from the PABX enterprise sales division.**	GOOD – Because of good interpersonal skills, Mr. Jones has built a large and intense social network.	LOW – in a hyperactive environment, Mr. Jones does not have a direct interest in reflecting on how to best acquire or give his knowledge.	GOOD – Highly active and communicant, Mr. Jones understands very well the organization he is working for and is often aware of the latest news before anyone else.	Low intensity of knowledge sharing. Mr. Jones knows very well what knowledge resides in his organization and how to access it but he does not realize a need for the reachable pieces of knowledge.	- monthly review of lost contracts including one or two technicians - sales project reviewed by senior manager of other areas - PABX crash program with invitation of technicians for full days spent with salesmen.

Those 3 specific vignettes are quite striking in regard to the awareness notions presented in the first part of the findings' section. They also illustrate boldly the link which can be drawn between awareness development and knowledge sharing mechanisms. The discussions fueled by those three cases brought forth the three points that are presented below.

First of all, each case is a great exemplification of the absolute requirement of the three joined types of awareness before any knowledge transfer can happen. In the 3 situations, one type of awareness was not deemed to be at a sufficient level. It is the unsatisfactory use of the existing knowledge residing in the organization that drew the attention of the managers in each case. It gives a strong support to the claim that the weakness in a single type of awareness can be responsible for seriously impeding the involvement of individuals in advantageous knowledge sharing.

Secondly, the interviews and the three cases made us understand that the quantification of the effect of each mechanism on the development of the different types of awareness is a difficult task. Most of the time, managers make use with reason of several mechanisms and, in the midst of so many actions taken by management, it is hard for the researcher to claim for sure what action has caused what result and in what exact proportion.

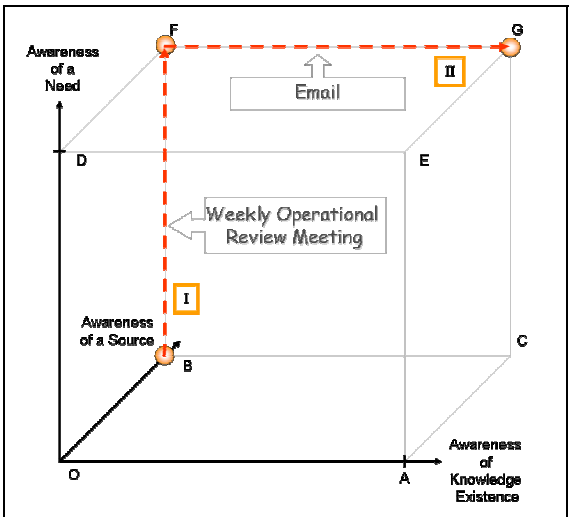
However, and this is the third point, the three cases demonstrate clearly that knowledge sharing mechanisms have definitively a role to play in helping individuals develop their awareness. Going further, it looks like some mechanisms have a different influence depending on the type of awareness that is considered. Some of them have more impact on the development of the awareness of knowledge needs, while some others will be better at improving the awareness of sources or the awareness of knowledge existence. Of course, some mechanisms may offer simultaneously great benefits for the three types of awareness.

The next subsection examines this last but critical argument using the knowledge-sharing-event vignettes presented earlier.

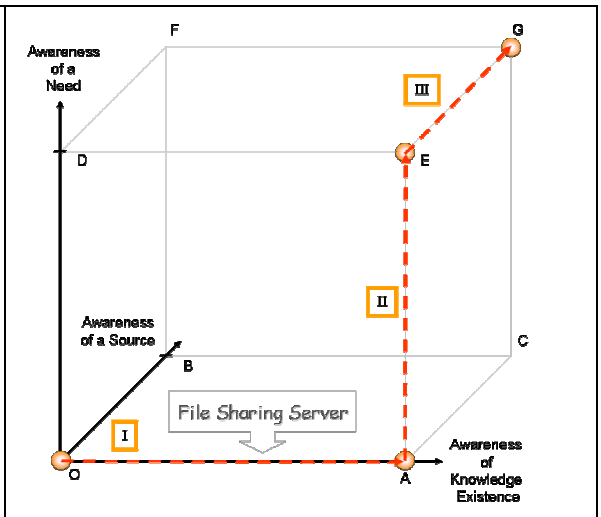
4.4.6. Three types of Awareness/Knowledge Sharing Mechanisms

The previous subsection exposed three cases in which a manager helped a team or an individual improve the outcome of the awareness development process through the design and support of different collections of knowledge sharing mechanisms. It appeared that different mechanisms were chosen with the objective of facilitating the development of different types of awareness.

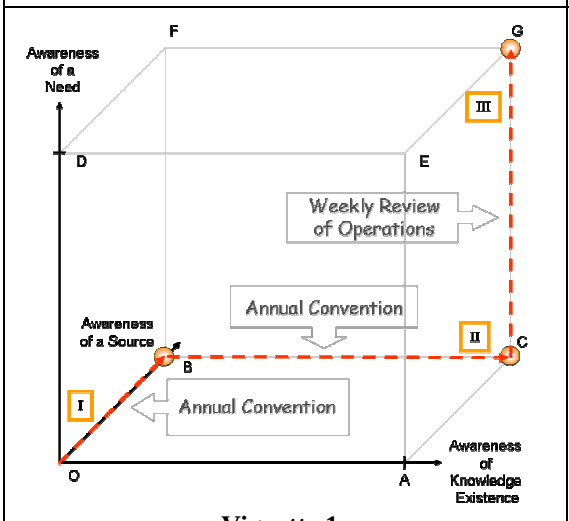
In the present subsection, it is proposed to view this argument in the light of the six "knowledge-sharing-event" vignettes presented earlier. For each vignette, and for every move from an awareness state to another, we try to identify the knowledge sharing mechanisms that underpins the acquisition of a certain type of awareness. The following table (see Table 24) summarizes this undertaking.



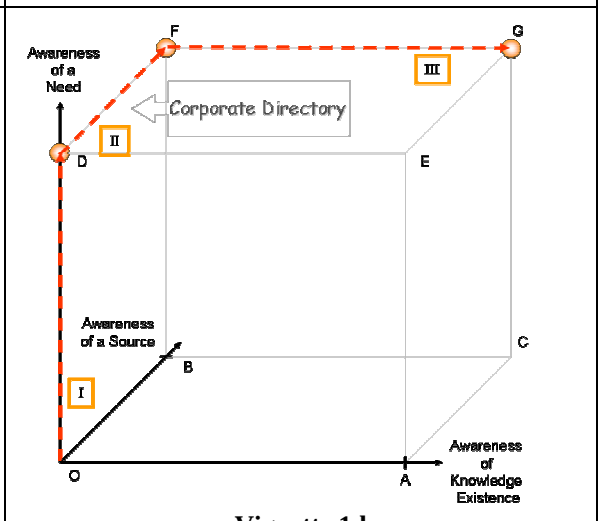
Vignette 1a



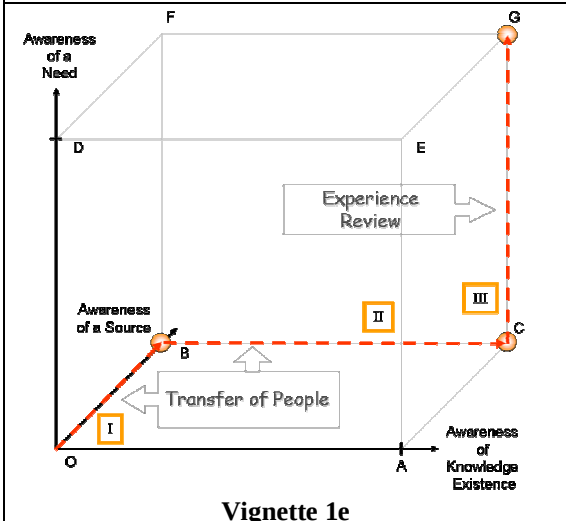
Vignette 1b



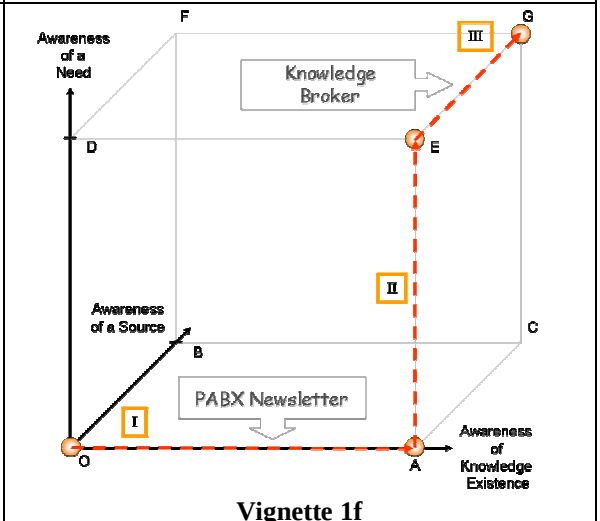
Vignette 1c



Vignette 1d



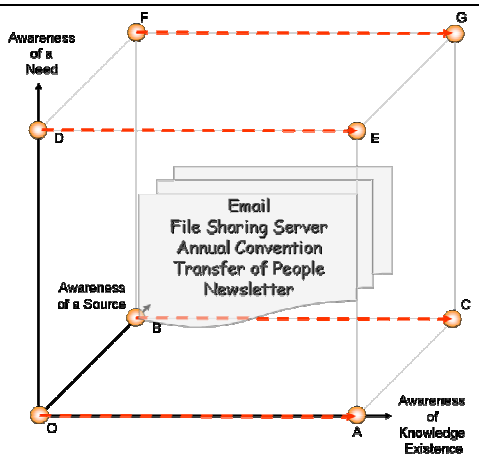
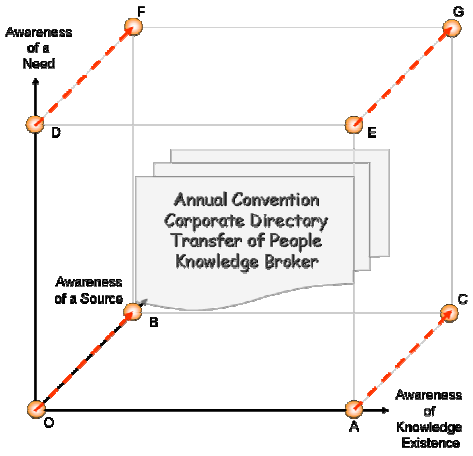
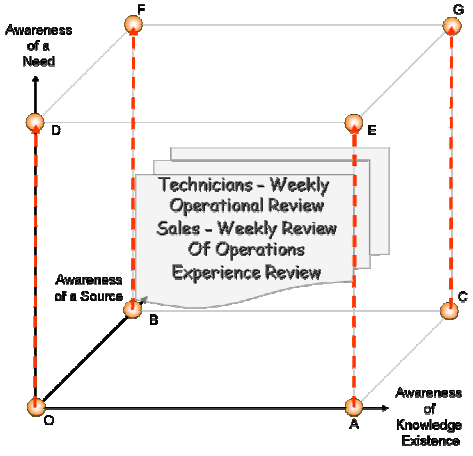
Vignette 1e



Vignette 1f

Table 24 - "Knowledge Sharing Event" vignettes and Mechanisms

The above table (see Table 24) shows how specific knowledge sharing mechanisms have been used by the studied organization members to move from an awareness state to another. Before jumping to any conclusion, the next table proposes an overarching view of the six vignettes. It regroups the various knowledge sharing mechanisms depending on the type of awareness they have developed in the six knowledge sharing events that were examined.

	"Email", "File Sharing Server", "Annual Convention", "Transfer of people" and "Newsletter" are the knowledge sharing mechanisms found in our vignettes to have been used for the development of the awareness of knowledge existence.
	"Annual Convention", "Corporate Directory", "Transfer of People" and "Knowledge Broker" are the knowledge sharing mechanisms found in our vignettes to have been used for the development of the awareness of a knowledge source.
	The "weekly operational review" for technicians, the "weekly review of operations" bringing together salesmen and "experience review" are the knowledge sharing mechanisms found in our vignettes to have been used for the development of the awareness of knowledge need.

The previous section suggested that different knowledge sharing mechanisms bolster the development of different types of awareness. The analysis above lends additional support to this argument. One can observe that in the six "knowledge-sharing-event" vignettes, the three types of awareness have been acquired through mechanisms that present different properties.

We propose 3 dimensions on which the knowledge sharing mechanisms we encountered can be assessed.

- **Knowledge-Existence-Driven Mechanisms**: those mechanisms have a highly positive influence on the development of the awareness of knowledge existence. Typical examples of those knowledge sharing mechanisms found in FRANCE TELECOM could be the "newsletters" mechanism, the "web portal" mechanism, or the "PABX technician knowledge database".

- **Knowledge-Source-driven Mechanisms:** those mechanisms have a highly positive influence on the development of source awareness. As an illustration, one may cite the "corporate yellow pages" mechanism, the "use of a well-connected tutor", or the "PABX annual convention".

- **Knowledge-Needs-Driven Mechanisms:** those mechanisms have a highly positive influence on the development of the awareness of knowledge needs. For instance, it may be the "project review by a senior manager" mechanism, the "review of lost contracts" mechanism, the "weekly review meeting by the technicians of the installation/maintenance centers", etc…

PROPOSITION 5: Each knowledge-sharing mechanism exhibits a specific and inherent ability to facilitate the development of a certain type of awareness. Consequently, every mechanism can be assessed on a set of 3 dimensions: its knowledge-existence-orientation, its knowledge-source-orientation, and its knowledge-need-orientation.

Plotting, even roughly, the collection of knowledge sharing mechanism used by a firm helps visualize the various composition and global orientation of the studied set. For example, in the case of FRANCE TELECOM PABX division, in the department we have studied, one may plot the following graph.

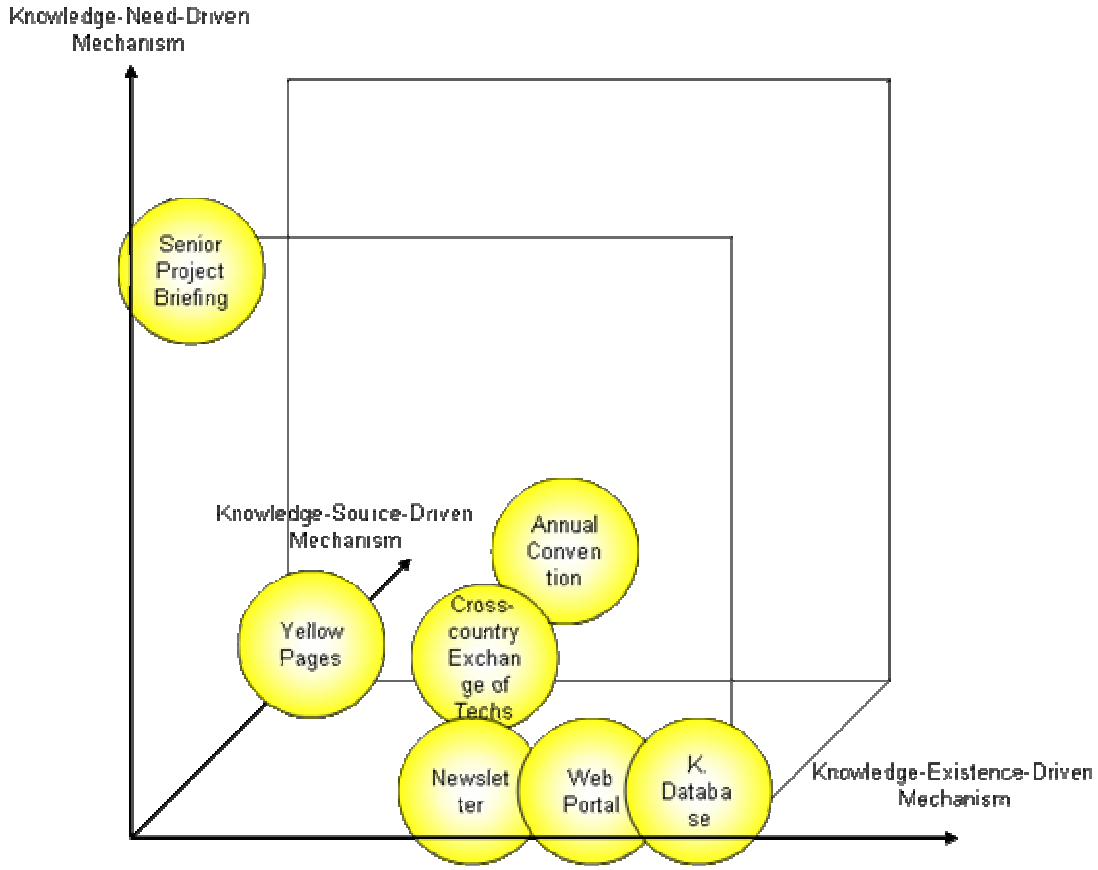


Figure 29 - Knowledge Sharing Mechanisms and Ability to Influence the development of the three awareness types

To avoid overloading the graph, not all mechanisms were plotted.

We suggest with this figure that plotting a collection of mechanisms on the three dimensions that virtually define the influence of mechanisms on the development of the three types of awareness is an effective way for managers to visualize at a glance how their organization has effectively or not implemented the knowledge sharing mechanisms that are needed to address the awareness development needs of their employees. The practical implications that can be derived from this representation will be discussed later on.

Before concluding this section on the findings that stem from this research, it was felt that the link between knowledge sharing mechanisms and locus of search required some further investigation.

4.4.7. Knowledge Sharing Mechanisms and Locus of Search

The section above suggested that each knowledge mechanism has different capabilities when it comes to influencing positively the development of the different types of awareness. In this section, it is claimed that different knowledge sharing mechanisms will contribute to the awareness development process with different degrees of effectiveness depending on locus of search considered. In other words, it is argued that certain mechanisms are more appropriate for certain loci of search. A mechanism that is appropriate for an individual actively looking for a certain piece of knowledge ("classic search") may prove unusable in a situation involving scouting search, and conversely.

This hypothesis inferring a relationship between knowledge sharing mechanisms and loci of search emerged from the analysis of the three vignettes presented on the section dedicated to awareness (Vignette 1a, 1b, 1c, 1d, 1e, 1f).

For instance, Mr. Baumet used the "corporate yellow pages" mechanism to find the contact information of his colleague Mr. Violet in vignette 1d. It constitutes the search for a specific source of knowledge. By contrast, in vignette 1c, the technicians and sales representatives of the PABX business have chosen to develop their awareness of sources by participating in the annual convention. While, in the former case, the development of awareness of a source happened in a "classic search" locus, in the latter case, the development of the same type of awareness occurred in a "scouting" locus of search. It does not seem likely that mere chance is to explain the choice of using two different mechanisms with the aim of developing the same type of awareness. It is fairly provocative to think that Mr. Baumet could have chosen to

search Mr. Violet by looking around at the annual convention. Conversely, one can hardly imagine that the yellow pages can be browsed with the hope of getting in touch with some unknown and interesting people. The bottom line here is that some knowledge sharing mechanisms will prove more effective for certain loci of search.

As another example, one may consider the "technician knowledge database" mechanism versus the "newsletter" mechanism. Both can be deemed as good knowledge sharing mechanisms for the development of the awareness of knowledge existence. However, the knowledge database mechanism is designed for an active and directed search (vignette 1a) whereas the newsletter mechanism would fit more appropriately in the case of scouting search (e.g. vignette 1f). One more time, it is not common to browse a knowledge database with no search directions in mind, neither it is to archive all the newsletter received with the hope of searching a specific piece of knowledge among them at a later time.

The two above examples exposed two cases where a mechanism have different impacts in fostering the development of awareness in a context that encompasses a *classic* and *scouting* locus of search. Referring to the previous section on awareness, one may remember that a total of four loci of search were suggested. The two first loci among the active search were the *classic search* locus and the *scouting* locus of search while among the passive search, there were the *prince-charming* and *serendipitous* locus of search. This raises the question of knowing if a mechanism can also be used in the case of a passive search. By the term of passive search, it was meant that no dedicated resource (time and effort) is committed to the search. By looking back at the list of mechanisms derived from our FRANCE TELECOM case and by considering attentively the vignettes, it comes out first that most of the mechanisms require the use of some resources allocated to the search, whether it is a directed or undirected search. As a result, it means that most of the mechanisms can be differentiated depending on their influence on the performance of a *scouting* search or *classic* search. However, looking at this issue with more diligence, one can claim that some mechanisms

actually contribute to the development of awareness notwithstanding no time or effort is committed to the search. The "lunch with a theme" mechanism is a mechanism where the search of awareness development is only a background concern. No real time or effort is committed to this search. The most likely outcome is the development of awareness in a *prince charming* manner since some kind of specific awareness is sought but no active search is engaged. Last, without having encountered an ideal case in FRANCE TELECOM to exemplify this point, it was said at two occurrences during the interviews that the office layout played a role in the way employees share their knowledge. This kind of knowledge sharing mechanism can serve as an illustration of mechanisms through which awareness is developed in a *serendipity* manner, with no active neither directed search being engaged. Similarly, social events or coffee corners fall in the same category.

In a more systematic fashion than the above, Table 25 revisits the six "knowledge-sharing-event" vignettes and presents the various associations found between knowledge sharing mechanisms and loci of search.

Vignette	Knowledge Sharing Mechanism used	Locus of Search associated
1a.	Weekly Operational Review Meeting	Classic Search Finding
	Email	Classic Search Finding
1b.	File Sharing Server	Serendipitous Encounter
1c.	Annual Convention	Scouting Search
	Weekly Review of Operations	Classic Search Finding
1d.	Corporate Directory	Classic Search Finding
1e.	Transfer of People	Scouting Search and Prince Charming Encounter
	Experience Review	Classic Search Finding
1f.	PABX Newsletter	Scouting Search
	Knowledge Broker	Classic Search Finding

Table 25 - Mechanisms and loci of search

Based on the above results (Table 25) and including the additional mechanisms found in France Telecom, the table below proposes to summarize this discussion on the relationship between knowledge sharing mechanisms and locus of search by roughly classifying the different knowledge sharing mechanisms depending on their ability to contribute to the development of awareness in the different loci of search.

Scouting-Oriented Mechanisms	**Classic-Search-Oriented Mechanisms**
- Annual Convention - PABX Newsletters - Transfer of People - Weekly phone conference among installation centers - Corporate Web Portal - Tutoring - Project briefing - Crash program - Exchange of technicians among installation centers	- Weekly review of operational activities by technicians - Email - Corporate Directory - Experience Review - Knowledge Broker - Technician Knowledge Database - Corporate Web Portal - File Sharing Server - Application Sharing - National Tele-Training - Crash program
Serendipity-Oriented Mechanisms	**Prince-Charming-Encounter-Oriented Mechanism**
- Office layout / Open Space - Social events - Coffee corner	-Lunch with informal keynote

Table 26- Examples of mechanisms and Locus of Search

This classification presents with no doubt a part of arbitrary and depends, in top of that, on the exact definition and usage of each mechanism by organization members of a company. But, basically, a knowledge sharing mechanisms can exhibit different properties such as a classic-search orientation, a scouting-orientation, a prince-charming-encounter-orientation, or at last, a serendipity-orientation.

PROPOSITION 6: Different knowledge sharing mechanisms will have different impact on the development of individual awareness depending on the locus of search they are used with.

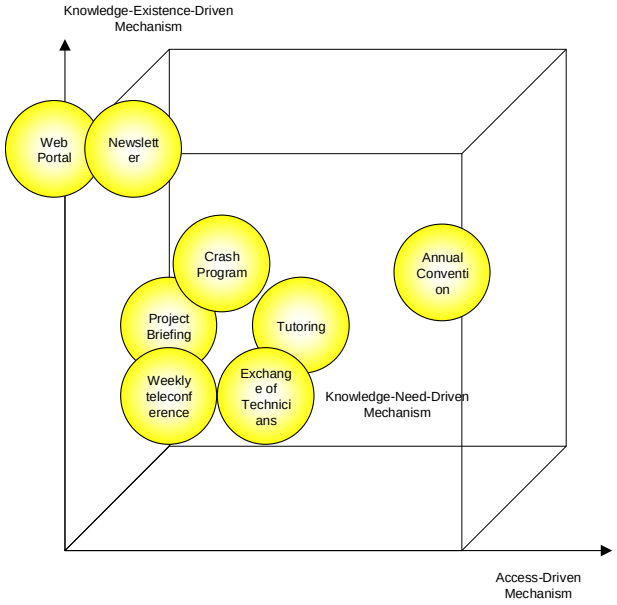
The following subsection intends to conclude the large section on the relationship between knowledge sharing mechanisms and awareness development through a merger and synthesis of the present and former subsection.

4.4.8. Conclusion: Supporting the right mix of knowledge sharing mechanisms

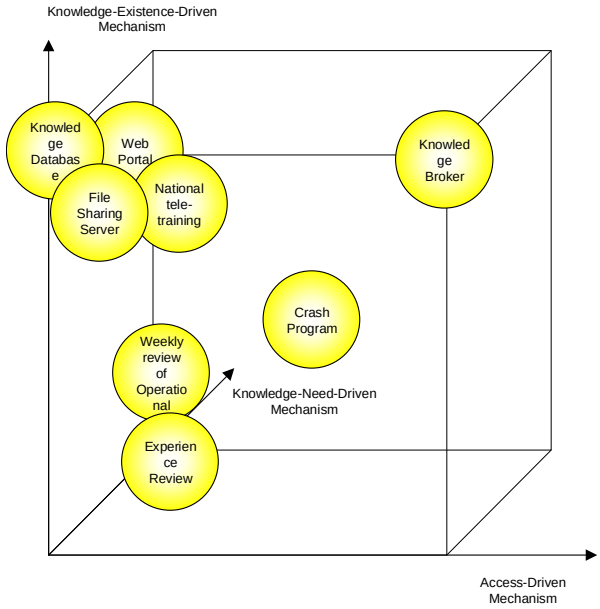
This section on knowledge sharing mechanisms has oriented its efforts toward the exploration of the relationship observed between sharing mechanisms and development of awareness.

After having listed a collection of knowledge sharing mechanisms encountered during our stay in FRANCE TELECOM, it appeared that management has to decide the degree of control to be exercised on the mechanisms used in organizations. This control on what mechanisms should be used and on how they should be gives the possibility and responsibility for managers to design and support sets of mechanisms that foster the employees' development of the right types of awareness. From the analysis of our vignettes, it emerged that different mechanisms have different impacts on the type of awareness being developed, and, in top of that, that they have more or less capabilities depending on the locus of search they are used with. A tentative figure synthesizing those assumptions is given below (Table 27).

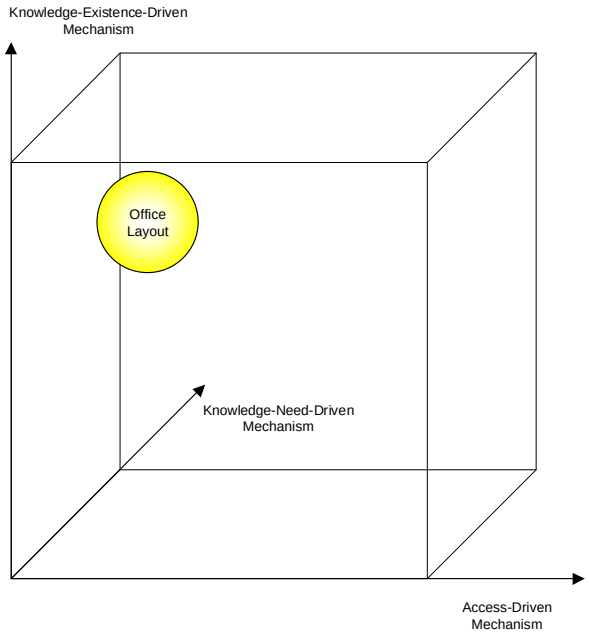
Scouting-Oriented Mechanisms



Classic-Search-Oriented Mechanisms



Serendipity-Oriented Mechanisms



Prince-Charming-Encounter-Oriented Mechanism

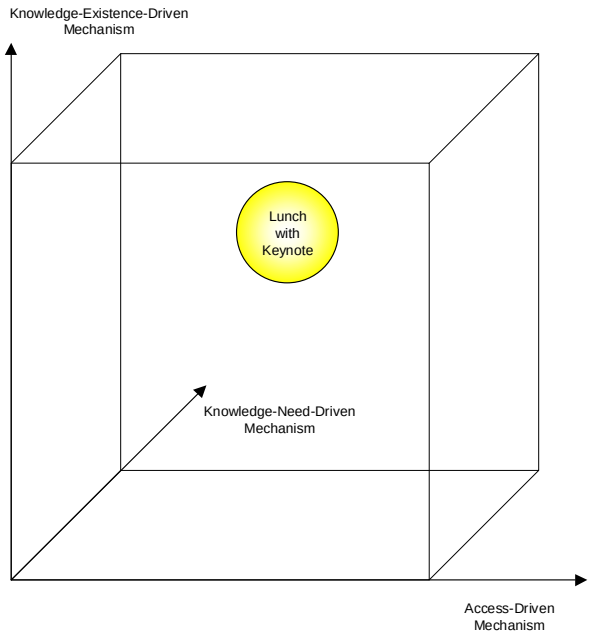


Table 27- Sharing Mechanisms, Types of Awareness, and Loci of Search

4.5. CONCLUSION

This chapter has exposed the main findings made during our study as we have tried to answer the important questions relating to the development of awareness and to the relationship that may be found between this development and the sets of knowledge sharing mechanisms used in organizations.

A short section introducing the FRANCE TELECOM Group and its PABX division has reinsured the relevance of the research questions and the appropriateness of FRANCE TELECOM as the main case for this research. The observation of a collection of 6 vignettes describing a variety of knowledge sharing events suggested that the concept of awareness should be considered as comprising three basic constituents and that the different paths that lead to the obtention of the three types of awareness called for different loci of search. Various patterns of awareness development and loci of search usage were observed. Complementing this perspective on awareness, a list of 22 knowledge sharing mechanisms encountered in FRANCE TELECOM was laid down. It revealed that every knowledge sharing mechanism exhibits simultaneously a technological dimension as well as a management dimension upon which management has the possibility and responsibility to define its degree of control. Relating to the 3 types of awareness, it was found that the knowledge sharing mechanisms described can be evaluated against three dimensions that we named “knowledge-orientation”, “Source-orientation”, and “Problem-orientation”. Additionally, it was argued that the mechanisms observed are proved to be more or less appropriate to certain loci of search. An integrated knowledge sharing mechanism selection framework was spawn from the combination the awareness-type and locus-of-search perspective.

5. Discussion and Conclusions

5.1. Introduction

This chapter proposes to review the findings exposed in this dissertation and discusses the implications for both practitioners and scholars. The openness of the research inquiry and the lack of integrated theories called for a case study approach. Consequently, in regard to the exploratory nature of this work, it is appropriate to view the main contributions of this research more as a rich, framed and organized collection of new insights rather than a statistically supported set of hypotheses. Going further, this final chapter is in a way an idiosyncrasy compared to the above, since, as Silverman (2005) puts it, while "much qualitative research works inductively, generating and testing hypotheses during data analysis, [the] final chapter is often the best place to present theoretical linkages and speculations".

This chapter commences by presenting a summary of the major contributions of this research and shows how the findings answer the set of research questions formulated earlier. Resting on this synthesis, a review of the implications that can be found for practice and theory follows. To conclude, the limitations of this study and the opportunities for further research are discussed.

5.2. Research findings

Today, few would argue against the claim that knowledge is a central resource upon which companies strive to build a sustainable competitive advantage (Drucker, 1993; Grant, 1996). Managing the knowledge that resides inside organizations is an essential constituent of any knowledge management strategy. It has been remarked that, increasingly, organizational knowledge takes a crumbled form, being distributed among employees and entities in firms.

In this context, and quite surprisingly, most research have focused their endeavors on issues in which an identified piece of knowledge is transferred from a certain knowledge source to a certain recipient. Very little has been undertaken to understand how those transfers are identified, or in other words, how individuals become aware of what knowledge should be transferred from who/where to who/where. The knowledge sharing mechanisms designed and supported by top-management are the tools used by organization members to share knowledge and develop their awareness. This led us to pose the set of research questions given hereafter:

- What is the concept of "awareness"?
- How is awareness developed?
- What are the mechanisms that facilitate the development of awareness?

The review of extant literature exposed clearly the lack of theory bearing on the concept of awareness and knowledge sharing mechanisms. Besides, most research more or less related to the topic was found to be confined by its respective discipline. Consequently, the exploratory nature of the research and the type of the research questions justified the decision to use a case study methodology. Six knowledge-sharing-event cases based on a collection of 12 extensive semi-structured interviews of managers from the France Telecom Group constitute the main data from which the findings are derived. Those findings and their relation with the research questions are summarized below.

5.2.1. Awareness, the knowledge necessary to consider advantageous knowledge transfers

The knowledge sharing process is often described as an awareness stage succeeded by a knowledge transfer stage. The attentive examination of six cases describing a variety of knowledge sharing events suggests that the "awareness" concept presented in literature actually refers to three different objects. In our study, it is found that, before considering any

knowledge transfer, an organization member need to acquire the awareness of a knowledge existence, the awareness of a knowledge source, and the awareness of a knowledge need.

Awareness of Knowledge Existence (or Awareness of What): this type of awareness is the awareness mostly referred to in literature. It is the awareness that a piece of knowledge does exist somewhere in the organization. This type of awareness refers to the meta-knowledge one may acquire about a piece of knowledge residing in the organization. It is different from the knowledge itself for the reason that this meta-knowledge is not directly usable by the recipient.

Awareness of Knowledge Source (or Awareness of Where): this type of awareness refers to the awareness of source ready to deliver its knowledge. Indeed, being aware of the existence of a piece of knowledge is not enough to consider a knowledge transfer. Before an individual can move on with the knowledge sharing process, it is essential that he or she discovers and gets acquainted with a knowledge source capable to give its knowledge.

Awareness of Knowledge Need (or Awareness of Why): this type of awareness refers to the awareness of a need for acquiring a certain piece of knowledge. Indeed, it was observed in our vignettes that the mere awareness of what knowledge exists and where to acquire it from was not enough. Without the realization of a problem of a need for this knowledge, no knowledge transfer could happen.

Notwithstanding its simpleness, the distinction of three distinct types of awareness (“what”, “where”, and “why”) has proved essential in the light of the gathered knowledge-sharing-event cases. The lack of a single type can prevent the identification of an advantageous knowledge transfer. But most importantly, this typology offers a fertile and sound ground to comprehend further the process through which organization members develop their awareness and shed new lights on the influence of knowledge sharing mechanisms on this development.

5.2.2. The development of awareness by organization members

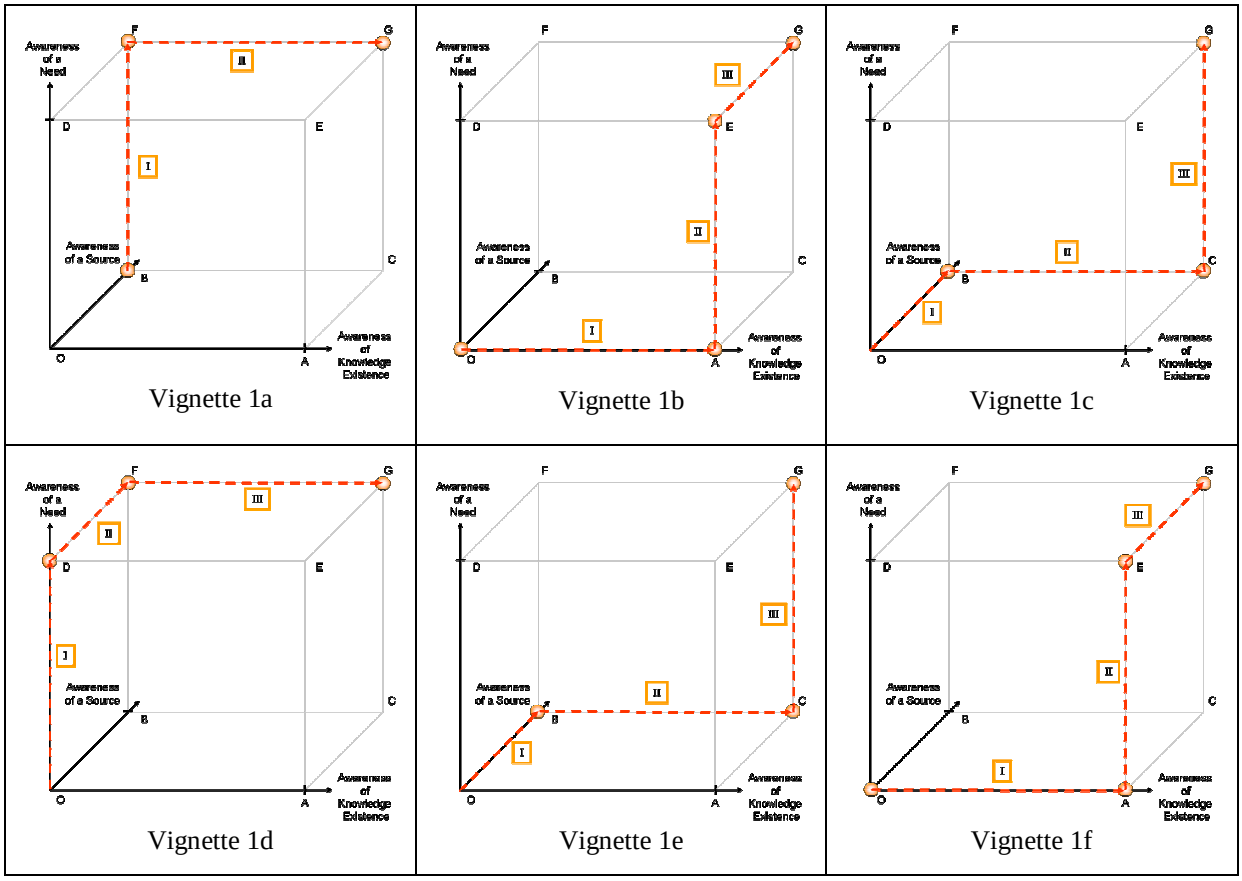
The identification of three types of awareness leads to the distinction of 8 possible states of awareness (Table 28). Knowledge transfers can possibly commence only once complete awareness (state "G") is developed.

	Description	Awareness of Knowledge existence	Awareness of Source	Awareness of Need	Matrical representation
State O	The future recipient is not aware of anything.	0	0	0	$O\begin{pmatrix}0\\0\\0\end{pmatrix}$
State A	The future recipient knows about the existence of a piece of knowledge but has not realized its need for it and is not aware of a source ready to transfer it.	1	0	0	$A\begin{pmatrix}1\\0\\0\end{pmatrix}$
State B	The future recipient knows a source that has an interesting knowledge but is not aware of the existence of the knowledge and is not aware of a need for this knowledge.	0	1	0	$B\begin{pmatrix}0\\1\\0\end{pmatrix}$
State C	The future recipient is aware of a piece of knowledge and of a source that could transfer it. However, the future recipient has not realized the need for the piece of knowledge.	1	1	0	$C\begin{pmatrix}1\\1\\0\end{pmatrix}$
State D	The future recipient has realized a need for knowledge but is not aware of the existence of a relevant knowledge neither of a source.	0	0	1	$D\begin{pmatrix}0\\0\\1\end{pmatrix}$
State E	The future recipient is aware of a need and of the existence of a piece of knowledge that answers this need. However, he is not aware of a source that would deliver the relevant knowledge.	1	0	1	$E\begin{pmatrix}1\\0\\1\end{pmatrix}$
State F	The future recipient has realized a need for knowledge and knows a source that could give this knowledge. However, the future recipient does not know about the existence of the knowledge.	0	1	1	$F\begin{pmatrix}0\\1\\1\end{pmatrix}$
State G	The future recipient is aware of the existence of a piece of knowledge, is aware of a source ready to transfer it, and is aware of a need for this transfer.	1	1	1	$G\begin{pmatrix}1\\1\\1\end{pmatrix}$

Table 28- 8 awareness states and matrical representation

A visual representation of the awareness development paths exhibited by the six vignettes (see Table 29) suggests that no unique pattern leads to the obtention of complete awareness. The identification of an advantageous knowledge transfer may begin with the discovery of an unknown knowledge, the discovery of an unknown source, or the discovery of an unknown

need. Of course, sometimes, organization members simply develop the three types of awareness all at once.



Vignette 1a | Vignette 1b | Vignette 1c

Vignette 1d | Vignette 1e | Vignette 1f

Table 29 - 6 awareness development paths

Additionally, the move from an awareness state to another is found to originate from four different loci of search (see Figure 30) that stem from the identification of two search dimensions.

- The **activeness** dimension of the search refers to how actively an organization member engages time and resources in the awareness search process.
- The **directedness** dimension of the search refers to how directed is the search, or in other words, to how precisely the subject organization member sees the awareness-object he or he is looking for.

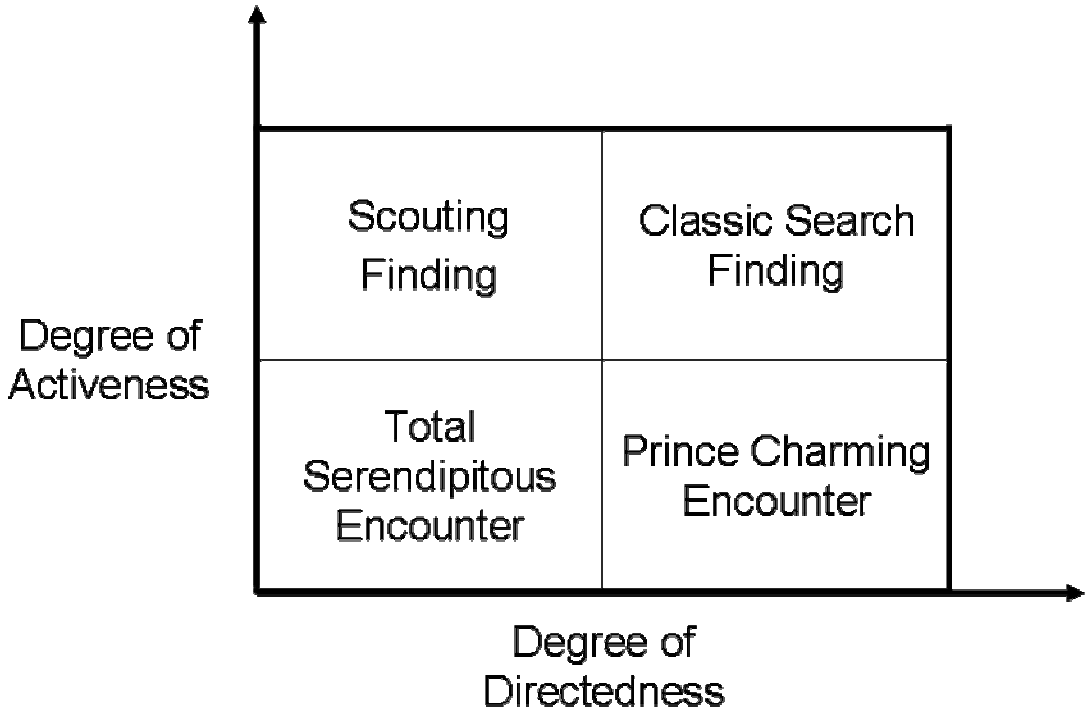


Figure 30 - 4 distinct loci of search

Further examination of the cases showed that while the awareness development paths of our vignettes started in any of the four identified locus of search, they all finished by a classic search finding. It is advanced that once a certain type of awareness is developed, an individual is more likely to update his or her perception of the interest for further developing his or her awareness in the other types, and what is more, he or she will have more clues about the most promising search directions to consider. Therefore, the *classic search* locus becomes more and more possible, eventually desirable, as the different types of awareness are developed.

As a result, it is assumed that some relationship exists between the developments of the three types of awareness.

5.2.3. *The influence of knowledge sharing mechanism on the awareness development process*

The observation of 22 knowledge sharing mechanisms encountered in France Telecom Group highlights the simultaneous existence of a technological dimension and a management dimension that apply to every mechanism. Executives have the possibility and responsibility

to design and support with more or less control a collection of knowledge sharing mechanisms that together foster proper knowledge sharing in organizations.

A set of three vignettes exposes comparable situations in which a manager successfully helps an employee develop the lacking awareness of a certain type through the promotion of a collection of specific knowledge sharing mechanisms. The further investigation of the six main knowledge-sharing-event vignettes suggests that different knowledge sharing mechanisms have different impacts on the development of the three types of awareness (see Table 30).

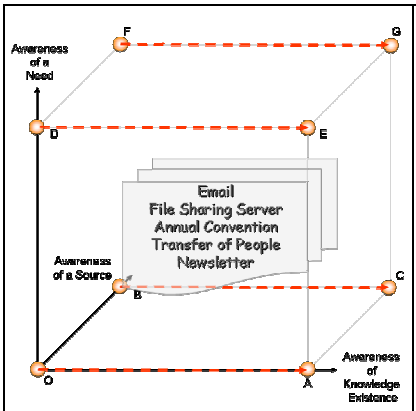
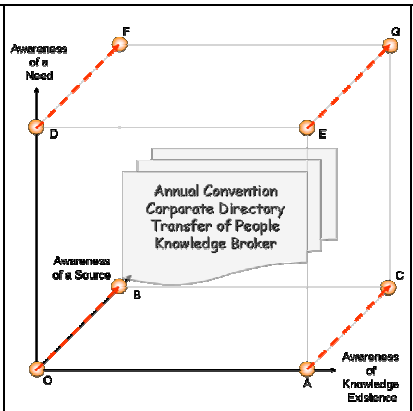
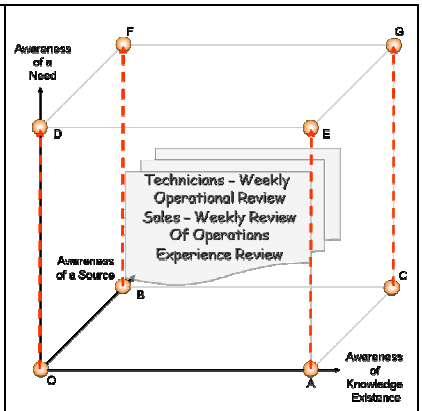
		
Knowledge Sharing Mechanisms used to develop the Awareness of a Knowledge Existence	Knowledge Sharing Mechanisms used to develop the Awareness of a Knowledge Source	Knowledge Sharing Mechanisms used to develop the Awareness of a Knowledge Need

Table 30 - 6 vignettes and the use of knowledge sharing mechanisms

In other words, mechanisms exhibit various abilities when it comes to foster the development of different types of awareness. We argue that **knowledge-existence-orientation**, **knowledge-source-orientation**, and **knowledge-need-orientation** are the three dimensions against which every mechanism can be assessed (see Figure 31).

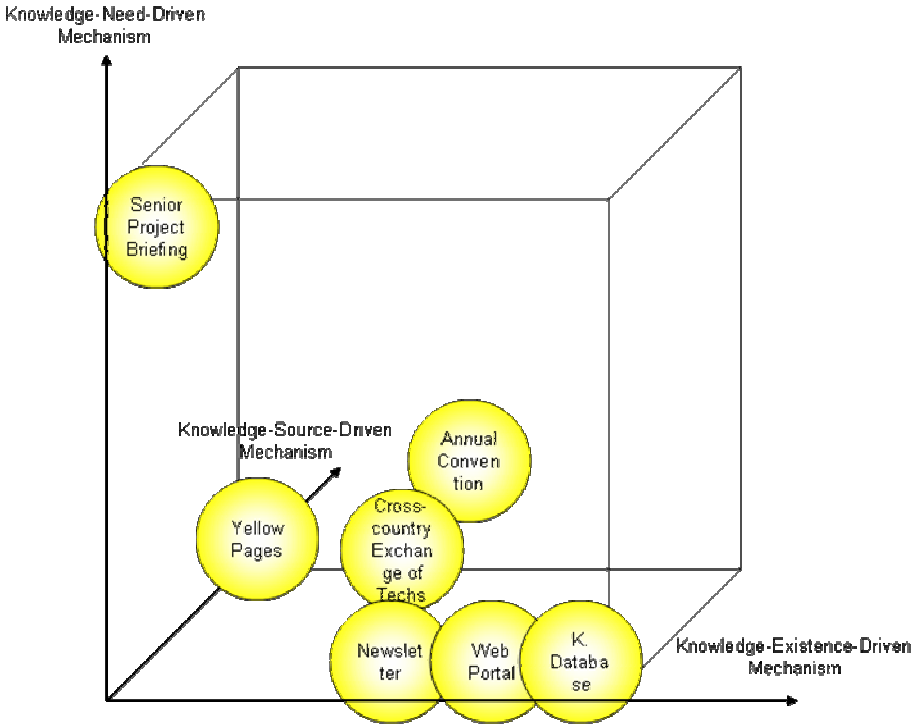


Figure 31 - Mechanisms and awareness-type orientation

Last but not least, still based on the study of the six knowledge-sharing-event vignettes, we advance that knowledge sharing mechanisms are more or less appropriate depending on the locus of search that is considered.

Scouting-Oriented Mechanisms - Weekly phone conference among installation centers - Corporate Web Portal - Newsletters - Tutoring - Project briefing - Annual convention - Crash program - Exchange of technicians among installation centers	**Classic-Search-Oriented Mechanisms** - Weekly review of operational activities by technicians - Technician Knowledge Database - Corporate Web Portal - File Sharing Server - Application Sharing - National Tele-Training - Experience review - Crash program - creation knowledge broker position
Serendipity-Oriented Mechanisms - Office layout / Open Space - Social events - Coffee corner	**Prince-Charming-Encounter-Oriented Mechanism** -Lunch with informal keynote

5.3. IMPLICATIONS FOR PRACTICE

Derived from the findings presented above, the implications for practice are threefold.

First, the refinement of the awareness concept into three types allows managers to identify precisely what problems they face and gives them a chance to focus on the strengths they can leverage upon. Indeed, in extant literature, the knowledge sharing process is constituted of two basic stages: “awareness” and “knowledge transfer”. The term of “awareness” is evoked in a generic manner and practitioners can hardly derive practicable implications from this fuzzy concept. Taking advantage of the clear distinction between the three types of awareness, executives and employees can now rapidly identify what exact flaws need to be fixed. Rather than recognizing a mere lack of “awareness”, it becomes possible to diagnose precisely the awareness needs. Indeed, an organization may present one of the following problems or a combination of them:

- **a lack of knowledge-existence awareness:** organization members may not be satisfactorily aware of what knowledge exists
- **a lack of knowledge-source awareness:** organization members may not be satisfactorily aware of where knowledge can be acquired from
- **a lack of a knowledge-need awareness:** organization members may not be satisfactorily aware of why certain knowledge are worth transferring.

From there, actions aiming at correcting inadequate conditions can be taken based on a sound and explicit rationale. Endeavors will be oriented toward the development of the weak types of awareness while no effort will be wasted trying to reinforce a type of awareness that is already at a satisfactorily level. What is more, the impact of the decisions taken by executives can be measured in a more appropriate manner.

Secondly, the identification of four loci of search gives the opportunity for practitioners to better understand how they and their organization develop the necessary awareness. Certain individuals may for instance realize that their organization is tied up to a unique locus of search. To illustrate this line of thought, one may imagine an organization understanding that its exclusive reliance on a “classic-search” locus (active/directed search) may originate from a culture in which crises and problems trigger too frequently the search for knowledge. This same organization could encourage as a complementary mode the “scouting-search” locus (active/undirected search) as a way to exploit new untapped knowledge-sharing potential. Similarly, an employee may realize from the 4-quadrant framework that most of his awareness development hinges upon a “prince-charming” locus of search (passive/directed search). This employee could then be tempted to use more often the “classic-search” locus in which he would pro-actively invest more time and effort actually searching for what he is after.

The third main implication takes the two previous sections as foundations. Based on the three-types-of-awareness notion and the four loci-of-search distinction, a knowledge sharing mechanism selection framework is brought forth. This framework classifies the 22 knowledge sharing mechanisms encountered in FRANCE TELECOM Group according to their ability to develop a certain type of knowledge through a certain locus of search (see Table 31). This framework relates to the concrete decisions an executive may make in order to improve a given situation. The previous implications gave the possibility for managers to audit and diagnose the strong pillars and weak links of their organization. Here, the framework suggests a way to act upon the performed diagnosis and proposes to use the design/support of an appropriate collection of knowledge sharing mechanisms as an appropriate tool to foster effective awareness development.

Table 31 - Knowledge Sharing Mechanism Selection Framework

This knowledge sharing mechanism selection framework can be used to help companies orient effectively their endeavors toward the resolution of any of the three awareness issues.

Notwithstanding firms are advised to use a combination of actions, three distinct strategies can be distinguished.

Improving Knowledge Sharing through the promotion of a Knowledge-Reuse strategy: In this scenario, the firm may decide to encourage the development of the knowledge-existence awareness. The framework recommends for instance the use of a knowledge database and file sharing server for a “classic-search” locus and a web portal supplemented by a corporate newsletter for a “scouting-search” locus. The predominant idea in this strategy is to make the knowledge residing in a firm visible to all organization members.

Improving Knowledge Sharing through the promotion of a Knowledge-Sourcing strategy: In this scenario, the firm may decide to encourage the development of the knowledge-source awareness. The framework recommends for instance the use of a gatekeeper and corporate directory for a “classic-search” locus and an annual convention or social events for a “scouting-search” locus. The predominant idea in this strategy is to have organization members become well aware of the knowledge sources part of their organization.

Improving Knowledge Sharing through the promotion of a Problem-Solving strategy: in this scenario, the firm may decide to encourage the development of the knowledge-need awareness. The framework recommends for instance the use of a focused weekly review of operations for a “classic-search” locus or an experience review with a senior manager for a “scouting-search” locus. The predominant idea in this strategy is to have organization members identify actively their need in some specific knowledge that would be useful to their operations.

5.4. IMPLICATIONS FOR RESEARCH

Several implications for theories related to knowledge sharing can be derived from the research findings presented above.

First, the refinement of the awareness concept into three distinct and well-defined types of awareness shed new lights on the upstream stage of the knowledge sharing process. It highlights the importance of the stage in which an advantageous potential knowledge transfer is identified and provides sound foundations upon which further theory can be developed. For instance, the first stage of the Szulanski's knowledge transfer process (2000) is called "initiation". This first phase commence with a "formation of the transfer seed" and finishes with a "decision to transfer". Using our framework, it can now be understood that this stage is actually the phase in which awareness of a knowledge existence, awareness of a knowledge source, and awareness of a knowledge need is acquired.

The second main implication our findings spawn relates to the process through which awareness is developed. Indeed and surprisingly enough, with few exceptions, researchers often assume that a certain type of awareness is developed prior to the development of the others, depending on the perspective that is taken. For example, in the Majchrzack's model of knowledge reuse, it is the re-conceptualization of a problem that leads organization members to the search/discovery of a knowledge existence and knowledge source. In the Szulanski's framework (2000) mentioned here-above, and similarly in the Chai's knowledge sharing framework (2003), the possibility of discovering first, either a need or either a piece of knowledge is acknowledged. However, in both cases, a previously-acquired awareness of a knowledge source is taken for granted. This research takes a holistic stance by considering all the different paths that extend from non-awareness to complete awareness.

The third implication for research on knowledge sharing stems from the introduction of 4 loci of search. As for most research, many of the concepts unveiled by this study do not originate

from the vacuum and find their roots in well-defined and mature theories. However, it is the framing and linking of a variety of concepts that hopefully produce new and valuable insights for practitioners and scholars. In our case, the "classic-search", "scouting-search", and "serendipitous-encounter" loci have already been investigated with great diligence. Having said that, the identification of two dimensions (*activeness* of the search and *directedness* of the search) first allowed us to relate the different terms one with another. Additionally, and most importantly, it has highlighted the existence of a fourth locus that we named "prince-charming-encounter". In other words, the four-quadrant framework presented in the finding section is thought to be useful for researchers interested in integrating various disciplines such as information seeking, scouting issues, and serendipity research, and it opens as well new directions to explore.

The fourth main implication worth mentioning relates to the assumed relationship that exists between the different types of awareness and various loci of search. Johnson (1996) suggests that "individuals are embedded in an information field that shapes the context of their information seeking. The nature of this field determines their exposure to information that triggers a desire to seek for more information". The meaning of this quote is two fold. First, it lends support to the argument that promoting the development of the awareness of knowledge sources among organization members does not only improve their awareness of where but would also improve their awareness of what. Secondly, it suggests that the level of awareness possessed by an individual does affect its behavior and choice for a "classic-search" locus. Our findings brings together in a structured fashion the theoretical elements on which further theory investigating the relationships between types of awareness and loci of search can be built upon.

The fifth and last essential implication for research bears on the new insights brought by this research onto the role of knowledge sharing mechanism in the knowledge sharing process. Indeed, most research touching on the concept of knowledge sharing mechanism does not take

into consideration the different stages of the knowledge sharing process and finds more interest in investigating the knowledge transfer capability (Chai, 2000). The findings from this study show that, not only knowledge sharing mechanisms are an important tool that influences the development of awareness in organization, but they also demonstrate that different knowledge sharing mechanisms have different impacts on the development of the three distinct types of awareness through the four identified loci of search. Recently, researchers like Criscuolo (2005) or Cross et al (2001) have indicated that knowledge sharing mechanisms should be used by managers to improve awareness in organization. For instance, Cross et al (2005) recommends the use of "skill-profiling system", "corporate yellow pages", "help desks", and "knowledge fairs" to help organization members increase their awareness of "who knows what" in their firm. Notwithstanding those recommendations open interesting perspectives for executives, no theory is developed to advise management on how to use and combine different knowledge sharing mechanisms and neither on why to do so. It is believed that the knowledge sharing mechanism selection framework presented herein addresses appropriately this concern.

5.5. LIMITATIONS OF THIS RESEARCH AND FUTURE WORK

The concept of awareness, the process through which it is developed, and its relationship with knowledge sharing mechanisms constitute a collection of issues that has drawn surprisingly little attention from researchers, and so, despite the proven importance of those matters in the eyes of firms and scholars. In this research, from the formulation of the research questions to the analysis of the sub-cases through the design/implementation of the research design, the amount of effort, care, and foresight have been limited only by the researcher's abilities, resources, and time constraints. New insights and better understanding of the focal issues described above have been gained. The implications for both practitioners and researchers are

substantial. However, as with all research, the present work comprises certain limitations that are worth exposing as they open the way to further promising undertakings.

Qualitative approach and Generalization of research findings

Due to the exploratory nature of this study and the "how"-type of the research questions, a qualitative approach and the use of a single master case in France Telecom Group have been decided. While presenting many fruitful qualities, the chosen research design also comprehends some inherent limitations.

The fact that the various cases presented in the analysis chapter originate from a same and unique company calls for further studies to be conducted across a larger sample of companies with the objective of reinforcing the external validity of the herein findings.

Additionally, whereas the qualitative approach significantly helped comprehend the context, reveal important constructs and identify interesting relationships, a quantitative approach would now be appropriate to test the findings based on a set of statistical tools applied to a broader sample. This undertaking would increase the robustness of the present theory.

Practicability of Research findings

All along the research process, the objective of producing actionable knowledge directly relevant to practitioners was kept persistently well in sight. The creation of a knowledge sharing mechanism selection framework and the identification of different knowledge sharing strategies stem from this clearly-acknowledged concern. However, as one may point out, there is still a gap between the implications advanced above and the presentation of a management tool immediately usable by practitioners.

Operationalizing the developed theory into a consulting or audit tool would certainly prove to be better suited for practitioners and its application in several firms could generate in the same time rich and stimulating cases for scholars.

Time consideration

As Navarro (2006) remarks emphatically, research in the management field often focuses on the "what", "how", "why" questions while eluding "when" issues. This research is no exception, the time component did not appear as a major concern in regard to our research questions. In the six knowledge-sharing-event cases that were gathered, the awareness developed by organization members is used almost immediately after their obtention. Based on a different collection of cases, further research concerned with the way awareness is accumulated, stocked, forgotten or transformed over time may lead to promising results.

External environmental factors

This research had the clear purpose of investigating the awareness stage of the knowledge sharing process and identifying the relationship this stage exhibits with the knowledge sharing mechanisms used by companies. While knowledge sharing mechanisms are essential to explain how the three types of awareness are developed, there are other factors important to take into account when considering the awareness development process. Those environmental factors such as organizational structure, leadership, firm's culture may prove to be complementary and relevant issues worth examining further.

Implementation of Knowledge-Sharing strategies

The findings herein suggest that different organizational awareness problems can be addressed through the use of different knowledge sharing strategies. Those implications originate from a series of inter-related observations. Further research involving the implementation of those different strategies in similar and different organizational contexts would certainly yield valuable insights for both practitioners and research scholars.

5.6. CONCLUSION

The ability to promote effectively knowledge sharing within organizations has become a critical competence for executives evolving in a world in which knowledge is the primary source of lasting competitive advantage. The review of extant literature showed that while a significant number of managers struggle because of the increasingly distributed form taken by organizational knowledge, most research related to knowledge sharing looked into knowledge transfer issues where a piece of knowledge flows with more or less difficulties between a knowledge source and a recipient. The objective of this research is to address the identified gap through the diligent examination of the upstream stage of the knowledge sharing process and the investigation of the knowledge sharing mechanisms' influence on this phase. Due to the exploratory nature of the research inquiry, a case-based empirical research design is chosen. The collection and analysis of a set of six knowledge-sharing events, twenty-two knowledge sharing mechanisms, and three individual cases bring forth several new insights relevant to practitioners and scholars. These are:

- The identification of an advantageous knowledge transfer requires organizational members to develop three distinct types of awareness: the awareness of a knowledge need (or awareness of "why"), the awareness of a knowledge source (or awareness of "where"), and the awareness of a knowledge existence (or awareness of "what").

- The development of those three types of awareness can happen in several ways. One may obtain the three types simultaneously while another may start by developing the awareness of a knowledge existence, of a knowledge source, or of a knowledge need.

- The move from an awareness state to another happens in different contexts. "Activeness" and "directedness" of the search are the two dimensions considered. Four loci of search named "classic-search", "scouting-search", "prince-charming-encounter" and "serendipitous-encounter" are derived from those two dimensions.

- The knowledge sharing mechanisms used in organizations are essential both for the transfer of knowledge and for the development of awareness among organizational members.

- Certain knowledge sharing mechanisms are more appropriate for the development of certain types of awareness through a certain locus of search.

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Appendix A: Interview Questions

(Note: The semi-structured interviews which have been conducted in France Telecom were guided based on the set of questions presented below. The exact formulation of each question, the order according to which questions were asked, and the expectations regarding the answers' breadth and degree of detail followed rules of personal congeniality and depended upon the interviewees' position and on their familiarity with the subject of inquiry. The interviews were conducted in the mother tongue of both the interviewer and interviewees and questions had been translated from English accordingly, prior to the interviews. Anonymization of the answers was a condition agreed before each interview.)

Questions on Knowledge Sharing Events

- Can you remember precisely a recent knowledge sharing event in which you or one of your employees have received an interesting piece of knowledge in a bottom-up fashion?
- How did it start? Could you describe the very first stages of the sharing, before you or one of your employees actually received enough knowledge to actually be able to use it?
- Have you or one of your employees realized recently that a piece of knowledge residing in the organization could be really useful to your or your employees' performance? How did you get aware of this?

Questions on Individuals involved in unsatisfactory Knowledge Sharing Activities

- Do you have cases where you feel that among your employees, one, specifically, is not satisfactorily engaging in knowledge sharing activities? How would you explain this situation? What actions did you take?

Questions on Knowledge Sharing Mechanisms

- What are the knowledge sharing mechanisms commonly used within your companies?
- What mechanisms do you support in regard to your employees' needs to share knowledge? Why? How you and your employees actually use the mechanisms? How often?
- What mechanisms do you use when you are looking for some piece of knowledge? Why?
- What mechanisms are used by you and your employees when they face a problem?
- What would be the mechanisms which, according to you, have good results in having employees identify what knowledge they need to acquire and from where?

Appendix B: Determining the locus of search - underpinnings

The following table gives further details on the underpinnings justifying the identification of the loci of search found in the "knowledge sharing event" vignettes presented in section 4.3.2.

	From Awareness State	To Awareness State	Relevant Vignette Extract	Comments	Locus of Search Identified
Vignette 1a	B(0,1,0)	F(0,1,1)	"This issue was first raised during a weekly operational review meeting (hold every Friday as one of the initiative prescribed by the "lean management" program being implemented) in which technicians discuss the issues they have faced during the week and the solutions that have been tried out."	The technician team is searching actively for problems and needs they may share. It exposes a relatively high degree of activeness and directedness.	Classic-search Finding
	F(0,1,1)	G(1,1,1)	"Two weeks after the initial wondering and the beginning of the search, a very promising email came out from Robert Stamford, a former colleague of the Belleville service center who had been transferred to another location."	The team searches quite actively among their known knowledge source for a solution to their problem.	Classic-search Finding
Vignette 1b	O(0,0,0)	A(1,0,0)	"Lately, as he was browsing the various folders with the objective of preparing the next monthly inter-center phone meeting, he opened a few of the operational reports he encountered. One of the documents exposed a set of reporting sheets that were fairly innovative compared to what he was used to work with."	Mr. Smith does not spend specific resources searching for a piece of knowledge, neither search for anything in particular that relates to what comes later.	Serendipitous Encounter

	A(1,0,0)	E(1,0,1)	"Mr. Smith was aware that a financial focus had not been originally particularly promoted in the corporate culture. But he also knew that this was changing and that financial performance was rapidly becoming a focal interest. After some time spent reflecting, he thought that it would be valuable to him and the company to get some more knowledge from this discovered reporting procedure and to go further in this direction, to go toward a more cost-analysis oriented management."	Mr. Smith was not actively searching when he realized a need for knowledge about financial management of the centre. In the same time, he knew that identifying a need in this area would be helpful and a search direction was therefore granted.	Prince-Charming Encounter
	E(1,0,1)	G(1,1,1)	"Asking around, he shortly discovered that Mrs. Tyler, a former COFRATEL employee recently arrived in FRANCE TELECOM, was the author of those documents."	Mr. Smith searches actively for the author of the discovered report.	Classic-search Finding
Vignette 1c	O(0,0,0)	B(0,1,0)	"A total of more than 300 managers, salesman, technicians, etc are invited. The time is spent talking informally and attending presentations prepared by different actors. Employees come to know more people and exchange a lot about what they do and the problems they face."	The small-business sales team participates in the event. Participants are actively engaged in meeting new people but the search is not directed.	Scouting Finding
	B(0,1,0)	F(1,1,0)		Participants are actively sharing and discovering new knowledge but no direction is given in their search. They are open to any knowledge they may encounter.	Scouting Finding
	F(1,1,0)	G(1,1,1)	"In the small-business PABX sales department, during the weekly review of operations, the discussion turned to the poor performance of the sales team when it comes to give clients	The weekly review of operations specifically aims at sharing the operational problems faced by the PABX sales team. The search is therefore directed	Classic-search finding

			realistic dates of PABX implementation. Too often, the installation schedules given by salesmen to customers were not respected. A simple line of thought emerged."	and active.	
Vignette 1d	O(0,0,0)	D(0,0,1)	"One day, as a difficult situation happened with one of his client, he reflected and told himself that knowing more about server configurations and local area network would be really helpful to help his customers, and would increase his and their satisfaction."	A difficult situation with a client makes Mr. Baumet realize the need for more knowledge in the area of server and network administration. No active or directed search can be claimed.	Serendipitous Encounter
	D(0,0,1)	F(0,1,1)	"Searching on the intranet, he found the contact details of a colleague, Mr. Violet, from the network division with whom he had met some time ago in a huge joint installation project. After a phone call, the two colleagues agreed to have a friendy lunch the next day."	Mr. Baumet searches for a source that may help him know what knowledge could be useful in regard to his identified problem. The search is active and directed.	Classic-search finding
	F(0,1,1)	G(1,1,1)	"During this lunch, they discussed their job and their respective difficulties. Mr. Baumet was confirmed that knowing more about server configurations and some part of IP network administration would definitively be helpful to him and his team."	Mr. Baumet is looking for a knowledge that would address the need he has identified. The search is active and well directed.	Classic-search finding
Vignette 1e	O(0,0,0)	B(0,1,0)	"He discussed with his manager Mr. Falson about the possibility to be transferred for one month in the PABX enterprise division, in order to meet new people and know more about what they do."	Mr. Gilman has the desire to actively meet new people inside his organization but does not know who exactly he wishes to meet.	Scouting Finding
	B(0,1,0)	C(1,1,0)	"he discovered that a trend seems to emerge: the development of integrated solutions	Mr. Gilman has joined the other sales department. He does not	Prince-charming encounter

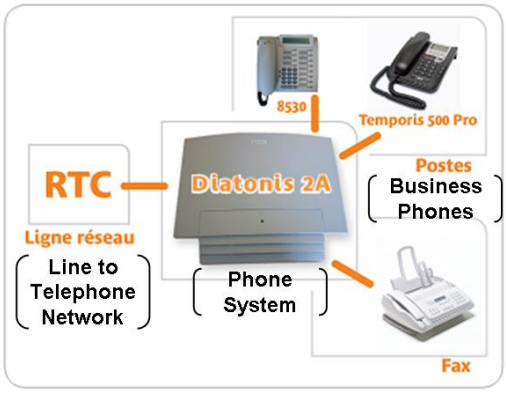
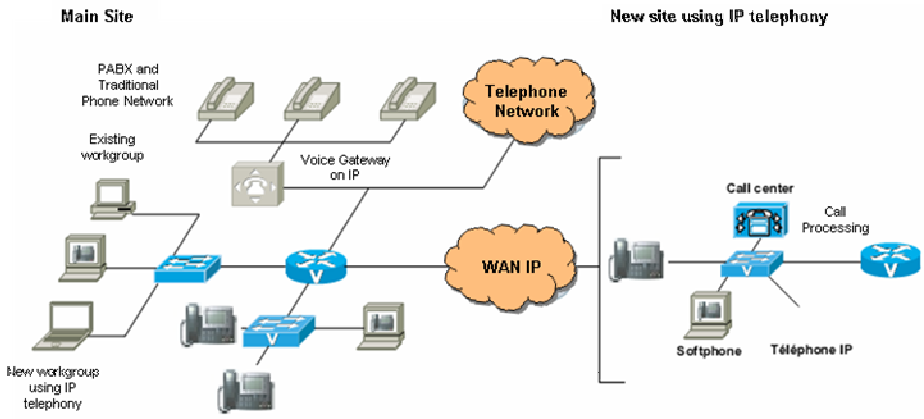
			including wireless wifi technologies and VoIP."	commit any particular resource on a search for knowledge (his objective is first to work in his new team) but he knows he expects to learn things in regard to the needs of his previous position.	
	C(1,1,0)	G(1,1,1)	"After he joined back his original team in the PABX small-business division, he discussed with his manager his experience and the learning he had gained out from it."	Mr. Gilman and his manager discuss the experience with the enterprise sales team and search actively for certain specific needs that apply to their business.	Classic-search finding
Vignette 1f	O(0,0,0)	A(1,0,0)	"Mr. Falson received a call from Mr. Poiset, a peer from the PABX division who had the same job position in the north region of France. Mr. Poiset explained that he had read about the crash program in the PABX newsletter."	Mr. Poiset finds out about the crash program being experimented after he read the PABX newsletter. Mr. Poiset commits some time to keep in touch with what is happening in the PABX business but does not look for a specific piece of knowledge.	Scouting Finding
	A(1,0,0)	E(1,0,1)	"He added that, very interested in it…"	Mr. Poiset realizes after reading the newsletter that the knowledge pertaining to the crash program experiement may be useful. The realization of this need occurs with no specific endeavors engaged and no direction known in advance.	Serendipitous encounter.
	E(1,0,1)	G(1,1,1)	"he had called the corporate department and had been advised to directly contact Mr. Falson."	Mr. Poiset search actively and with a clear direction a source of knowledge.	Classic-search Finding.

Appendix C: France Telecom PABX division – Services and Products Overview

France Telecom offers integrated communication solutions for companies ranging from one-man companies to multinational firms. The PABX division is concerned with the design, installation, maintenance, and leasing of private phone systems for its various clients. This appendix proposes a brief overview of the services and products sold by the division in which the present study was conducted.

Main services

- **Design, installation, and maintenance of integrated communication systems** integrated to the client's environment, including PABX features for voice-related needs as well as IP telephony and computer network services.

	A simple PABX system which makes possible to connect up to 8 business phones or faxes.
	Another example of communication architecture, more complex, with a regular PBX system along with IP phone equipments.

- **Financing solutions and leasing of PABX and phone equipments**
- **Examples of features facilitating exchanges:** call by name keying, 3-people phone conference, call transfer and forwarding, call filtering, speed dial, electronic mailbox, internet sharing, data exchanges, IP phone
- **Examples of features related to customer service:** voicemail system, waiting tune, call redirection, skill-based call routing
- **Examples of features related to mobility:** "Digital Enhanced Cordless Telephony", secure remote access

Example of products:

France Telecom designs and gives orders to a variety of telecommunication manufacturers (e.g. Motorola, Siemens, Alcatel). Most of the phone equipments are sold under the brand "France Telecom Diatonis". As an illustration, a few Diatonis phones are presented herebelow.

	
Business Phone "Diatonis 4039" dark gray with additional big-screen module	Business Phone "Diatonis 4039" dark gray with a 40-key lamp module

	Business Phone “Diatonis 4019”
	Business Phone “Diatonis 4029”
	Business Phone “Diatonis 4039”