DOKTORI (Ph.D.) ÉRTEKEZÉS

SZIRTES TAMÁS

Nyugat-magyarországi Egyetem

Sopron

2011

UNIVERSITY OF WEST HUNGARY
FACULTY OF ECONOMICS
ISTVÁN SZÉCHENYI MANAGEMENT AND
ORGANISATION SCIENCES DOCTORAL SCHOOL
BUSINESS ECONOMICS AND MANAGEMENT PROGRAM

MANAGEMENT OF KNOWLEDGE SHARING PATTERNS

Ph.D. DISSERTATION

By
Tamás Szirtes

Supervisor:
Dr. István Szűts CSc
Associate Professor

Sopron
2011

MANAGEMENT OF
KNOWLEDGE SHARING PATTERNS

Értekezés doktori (PhD) fokozat elnyerése érdekében

Készült a Nyugat-magyarországi Egyetem
Széchenyi István Gazdálkodás- és Szervezéstudományok Doktori Iskola

Vállalkozás gazdaságtan és menedzsment programja keretében

Írta:
Szirtes Tamás

Témavezető: Dr. Szűts István CSc

…..……..……

Elfogadásra javaslom (igen / nem) (aláírás)

A jelölt a doktori szigorlaton …… % -ot ért el.

Sopron, ……

…..……..……

a Szigorlati Bizottság elnöke

Az értekezést bírálóként elfogadásra javaslom (igen /nem)

Első bíráló (Dr. ……..) igen /nem …..……..……

(aláírás)

Második bíráló (Dr. ……..) igen /nem …..……..……

(aláírás)

A jelölt az értekezés nyilvános vitáján …… % - ot ért el.

Sopron, …… …..……..……

a Bírálóbizottság elnöke

A doktori (PhD) oklevél minősítése ….....

…..……..……

Az EDT elnöke

CONTENTS

1 INTRODUCTION 6

1.1 Background to the research 6

1.2 Justification of the research 7

2 LITERATURE REVIEW 10

2.1 Introduction 10

2.1.1 Knowledge from an economic point of view 10

2.1.1.1 Data vs. Information vs. Knowledge vs. Wisdom 11

2.1.1.2 Definitions 14

2.1.1.3 Types of knowledge 16

2.1.1.4 Nature of knowledge 19

2.1.1.5 The value of knowledge 23

2.1.1.6 The role of knowledge in the economy 25

2.1.2 Knowledge Management 30

2.1.3 Knowledge management processes 32

2.1.3.1 Knowledge generation 34

2.1.3.2 Knowledge storing 35

2.1.3.3 Knowledge sharing and transfer 35

2.1.3.4 Knowledge application 38

2.1.4 Knowledge Management and Information Technology 39

2.1.5 Knowledge Management and Culture 42

2.1.6 Motivation 44

2.1.6.1 Definition 44

2.1.6.2 Main theories 44

2.2 Literature focused on motivational aspects of knowledge sharing 46

2.3 Fiske's theory 54

2.3.1 Knowledge sharing patterns 58

2.3.2 Models of social relations with their implications for knowledge sharing 59

3 CONTENT, METHOD AND GOAL OF THE RESEARCH 61

3.1 Goal of the research 61

3.2 Content of the research 62

3.2.1 Introduction to Intenzz SAP Consulting Group 63

3.2.2 Introduction to the SAP Community Network 65

3.3 Methodology 68
3.3.1 Case study of Intenzz SAP Consulting Group 69
3.3.1.1 Online survey 70
3.3.1.2 Interview with the management 73
3.3.1.3 Knowledge Process Modeling 74
3.3.1.4 Interviews with the employees 79
3.3.1.5 Creation of guidelines and comparison with the findings of the research project "Coordination and Knowledge Transfer within Teams" 79
3.3.2 Case study of SAP Community Network 80

4 RESULTS 81

4.1 Findings in Intenzz SAP Consulting Group 81
4.1.1 Analysis of the online survey results 81
4.1.2 Analysis of the interviews 86
4.1.3 Analysis of the Business and Knowledge Process Models 86
4.1.4 Relational models within Intenzz SAP Consulting Group 88
4.1.4.1 Predominantly CS business processes 92
4.1.4.2 Predominantly AR business processes 93
4.1.4.3 Predominantly EM business processes 94
4.1.4.4 Predominantly MP business processes 95

4.2 Findings in the SAP Community Network 95
4.2.1 Community Sharing Features 97
4.2.2 Equality Matching Features 99
4.2.3 Authority Ranking Features 101
4.2.4 Market Pricing Features 102
4.2.5 Summary of the findings 105

4.3 Managing the patterns 105
4.3.1 Challenges in managing the patterns 107
4.3.1.1 Disagreement about the implementation method 107
4.3.1.2 Use of different models 108
4.3.1.3 Infrastructure is designed for another model 110
4.3.2 Recommendations about managing the patterns 111
4.3.3 KM guidelines 113
4.3.4 KM practices at Intenzz based on the management of the patterns 114
4.3.4.1 Communities of Practice 114
4.3.4.2 Knowledge sessions 120
4.3.4.3 Information technology 121

4.4 Comparison with the findings of the research project "Coordination and Knowledge Transfer within Teams" 123

4.5 Summary of the new scientific results 127

5 CONCLUSIONS AND RECOMMENDATIONS 130

5.1 Conclusions 130

5.2 Recommendations 132

6 SUMMARY 134

7 ÖSSZEFOGLALÁS 137

8 APPENDICES 140

8.1 APPENDIX 1: References 140

8.2 APPENDIX 2: Knowledge Sharing based on the RMT 166

8.3 APPENDIX 3: SCN research data analysis 169

8.4 APPENDIX 4: SDN member statistics 170

8.5 APPENDIX 5: Distinct correction cases 171

8.6 APPENDIX 6: Business and Knowledge Process Models 173

8.7 APPENDIX 7: Online Survey 188

8.7.1 Data entry 188

8.7.2 Data storing 192

8.8 APPENDIX 8: Questionnaire used for the Employee Interviews 194

8.9 APPENDIX 9: Knowledge Management Processes at Intenzz 195

9 ACKNOWLEDGEMENTS 198

1 INTRODUCTION

1.1 Background to the research

„All men by nature desire to know." (Aristotle 350 B.C.) Indeed, human history is mankind's continuous quest for knowledge. Throughout history, civilizations have merged, built knowledge, managed knowledge and when they collapsed, some of their knowledge survived, while other was lost. Knowledge has always been shared orally, later in a written form, even later in print and now as digital files. Knowledge has always been handled consciously and utilized to realize goals. However, knowledge management (KM) as such was not invented in the 20th century; it only became hyped in our post-modern era.

There are several reasons why knowledge management reached a completely different level in the late 20th century. To mention a few of the most important technological innovations which fostered the spread of information as never seen before, the micro-processor was invented (1971), which enabled the first personal computer (1974). In the same years, the videocassette recorder (1971) and the cellular telephone (1973) were born, followed by the compact disc (1981) and the DVD (1995). Nevertheless, the main innovation of the late 20th century, undoubtedly, was the Internet (The TCP protocol was developed in 1973.) which proved a powerful tool to communicate and spread information. Thanks to electronic mail (e-mail) and the World Wide Web, mankind's relationship to knowledge has changed. The amount of information available to individuals and organizations has skyrocketed. The effects of the Internet were also visible in the world economy: it attracted sizeable venture capital, fueling part of the technology boom of the 1990s, supported globalization, and led to the dot-com stock market bubble.

In this „knowledge economy" and „information society", during the mid-'90s, the number of articles on Knowledge Management began to increase sharply, then steadily through the early part of the 21st century. At the same time, consulting firms began to tout their Knowledge Management practices and business schools started offering courses in Knowledge Management. Knowledge management became the „Next Big Thing", a kind

of „pixie dust" which management pundits touted as a solution for any possible problem in any organization.

Already during the dot-com bubble, KM was treated as a new weapon in the arsenal of information technology. While the knowledge management hype curve flattened at the beginning of the 21st century, information technology (IT) companies remained active in marketing KM tools.

Besides this IT focus, a dominant cultural focus has risen as well. Thousands of articles have been published about knowledge sharing culture and how organizations should enable knowledge sharing by changing their culture.

The motivational aspects of knowledge sharing did not enjoy equal appeal as the above mentioned IT and cultural approaches. Relevant questions are "Why do people share information with co-workers or why do they not?" or "What motivates a person to give up personal knowledge to someone else?" The motivation for knowledge sharing has been investigated by various knowledge management researchers, but there has always been discord among the various theories. None of them were complete and the theories have just gotten ever more complex (see Chapter 2.2 for details).

1.2 Justification of the research

Fiske's Relational Models Theory, the centerpiece of this dissertation, was originally invented not to describe knowledge sharing, but generally, human relationships. Nevertheless, later a few researchers hypothesized that it could also be applied to knowledge sharing, since knowledge sharing is a human relation after all.

The author strongly believes that knowledge sharing on all levels, from small organizations to global networks, has an immense potential to improve human conditions. The above mentioned technical hype has passed and some of the main questions about knowledge remained unanswered. The author is inspired about the idea of applying Fiske's very powerful theory to knowledge sharing and thus enabling further developments in this field.

There have been attempts (Boer & Berends 2003, Bij et al. 2003) to show how Fiske's theory describes knowledge sharing, but these research projects focused on research and government organizations. The results were positive, and the theory proved to be applicable, but the question remained open, whether the theory is generally applicable for knowledge sharing.

Recent research in this field has been conducted by Boer & Berends (2003) who examined an industrial research group. The last sentence of their article cites very comparable research performed by Bij et al. (2003): "They may have gotten a different result when, for example, consultancy firms were studied." Fiske's theory and the above findings form the basis of this dissertation, but the goals (G) and hypotheses (H) of this research project reach beyond what these findings implied and cover the following:

G1: Prove the validity of Fiske's theory for a consulting firm and an online community

H1: Fiske's relational theory describes the knowledge sharing mechanisms in a consulting firm (called Intenzz SAP Consulting Group).

H2: Fiske's relational theory describes the knowledge sharing mechanisms in an online community (called SAP Community Network).

G2: Investigate the knowledge sharing practices within Intenzz SAP Consulting Group

H3: Since Intenzz SAP Consulting Group is a knowledge-intensive consulting company, the Community Sharing model dominates its internal knowledge sharing practices. (More than 50% of the motivation in the internal processes apply the Communal Sharing model.)

G3: Create practical guidelines for managing the knowledge sharing patterns within Intenzz SAP Consulting Group

Consequently, this research enhances current thinking in this field for the following reasons.

It adopts an interdisciplinary approach. In order to better understand knowledge sharing and support management science, it reaches out to psychology and anthropology. A theory, the Relational Models Theory (Fiske 1991), which originally described the behavior of people in the Moose culture in Burkina Faso was generalized by Fiske (1991), then adopted to knowledge sharing. This adoption provides insight into the motivational aspects of knowledge sharing, which are of paramount importance. Many organizations have invested significant sums in KM solutions, but these initiatives have stagnated. If the motivation for knowledge sharing is not clear (and clearly managed), then employees simply do not start contributing. (McCarthy & Sasse & Riegelsberger 2002). The Relational Models Theory (Fiske 1991) can be utilized to explain these crucial motivational aspects. It was already used by Boer & Berends (2003) to investigate research and governmental organizations, but this research proves the applicability of this theory to a consulting firm and an online community, which are significantly different organizations in terms of industry, size, and knowledge sharing. Furthermore, it introduced so-called knowledge sharing patterns as extensions of the original Relational Models Theory. Beyond reaching theoretical conclusions, this research has created recommendations and guidelines for knowledge management practitioners. Whether a consulting firm or an online community, there is a great degree of uncertainty about how to enable knowledge sharing. The recommendations and guidelines created in this project are very valuable and can be utilized in practice.

The various theories regarding motivation for knowledge sharing have not reached consensus yet. This research hopes to move the attention of future research in the direction of the Relational Models Theory (Fiske 1991). This project looks at a consulting firm and an online community, but there is another growing phenomenon in the Internet which warrants separate research: the motivation for knowledge sharing in the Open Source movement. This conclusion of the dissertation opens new directions for further research.

Since this PhD project was partially coached by the University of West Hungary and the Eindhoven University of Technology in the Netherlands, the author hopes that this work will spur cross-fertilization between these two universities for the benefit of both and could bring beneficial consequences beyond the scope of this project.

2 LITERATURE REVIEW

As earlier mentioned, the key question regarding knowledge sharing is why does knowledge sharing take place. In order to elaborate on this question, this chapter will first introduce the main relevant concepts such as knowledge, types, and nature of knowledge, the role of knowledge, knowledge management, the various aspects of knowledge management, and motivation. After this introduction, the motivational side of knowledge sharing is discussed. The review of relevant literature is divided into two subchapters: the first highlights the main theories regarding motivation for knowledge sharing, the second focuses on Fiske's theory exclusively. The literature review concerning Fiske's theory needs to be extensive since the hypothesis of this thesis is based on this theory. The goal of this chapter is to introduce the topic, define the main concepts and clarify the relationship of knowledge sharing and the key areas involved in the research such as market, culture, IT, motivation, etc.

2.1 Introduction

2.1.1 Knowledge from an economic point of view

> "Socrates: So tell me, in a generous spirit, what you think knowledge is.
> Theatetus: But Socrates, I cannot answer your question about knowledge…
> Socrates: Is it not one of the hardest questions?
> Theatetus: One of the very hardest, I should say."
> (from Plato: Theatetus (Cornford 1957, p. 24))

Indeed, understanding knowledge is one of the most difficult endeavors of mankind. This chapter is not going to challenge Plato, Socrates, Russell, Hume, Polányi, and other brilliant writers on this topic. Rather it will briefly introduce fundamental ideas about knowledge and dig into the economic aspects of knowledge more than the philosophical, social, and historical ones.

The value of knowledge is a key question given that the amount of information and knowledge is increasing exponentially. Vivid examples include: "In the last 20 years

general-purpose computing capacity grew at an annual rate of 58%." (Hilbert & López 2011) "About 1.2 zettabytes of digital data was created only in 2010." (IDC 2010) "The number of individual web pages is growing by several billion pages per day." (Google 2011) considers this rapid growth of available information to be an Information Revolution which marked the beginning of the Information Society.

This information overload, globalization, rapid change (making knowledge obsolete faster), the need to constantly learn and innovate, and the need to share best practices have been significant factors behind the growing importance of knowledge management within organizations in recent years. It has received the attention of managers at all hierarchical levels, not only knowledge management experts. The hype of knowledge management peaked a couple of years ago, and this, in the author's opinion, has created the possibility to discuss the topic in more depth.

This chapter examines knowledge from an economic point of view. Various definitions are introduced; then several classification schemes are explained. Next the nature of knowledge is discussed, leading to some thoughts on the value of knowledge. Finally, the role of knowledge is analyzed in conjunction with the most significant economic terms such as growth, innovation, market, etc. It will become evident that there is no consensus in the philosophical handling of knowledge or among economists about the key characteristics of knowledge – even if many claim that we live and operate in a Knowledge Economy.

2.1.1.1 Data vs. Information vs. Knowledge vs. Wisdom

T.S. Eliot (1934) in his poem, The Rock, asks: "Where is the wisdom we have lost in knowledge? / Where is the knowledge we have lost in information?" With these profound questions the poet illustrates the underlying difference among these terms. In contrast, in everyday conversations and unfortunately in a great number of "half-scientific" literature, the terms knowledge, information, and data are used interchangeably. Knowledge has become an increasingly "loaded" buzzword. This is harmful since precise definitions of these terms help avoid confusion and lay the foundations for further discussions.

Data, information, knowledge, and sometimes wisdom are often represented in a hierarchical, pyramid structure. Figure 1 (Srinivas 1999) shows a common "Knowledge Pyramid", which gives an impression of the relationship among the different levels.

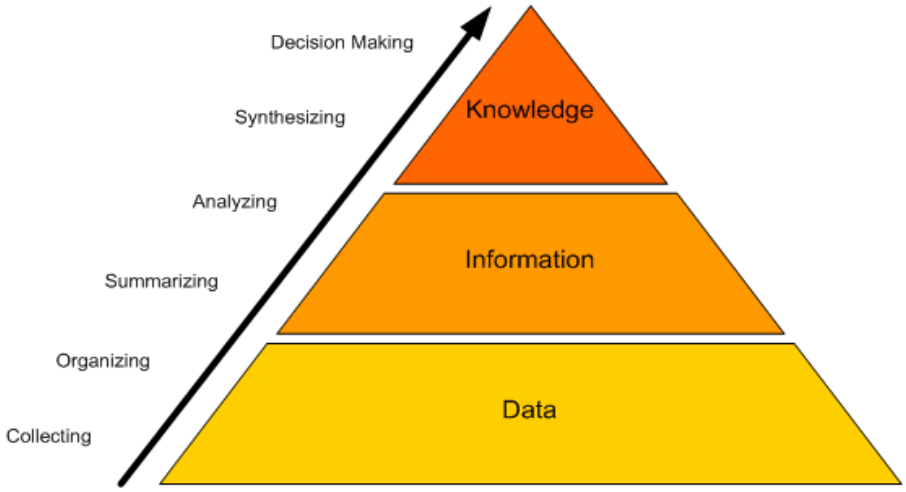


Figure 1: Data – Information – Knowledge (Source: Srinivas 1999)

Figure 2 shows the same hierarchy including wisdom. This representation has the strength of explicitly mentioning understanding and connectedness as bases for separating the various terms. (Ackoff 1989, Bellinger & Castro & Mills 2004, Sharma 2008) Note that word "patterns" in this figure do not refer to the patterns as used later in this dissertation when discussing knowledge sharing patterns.

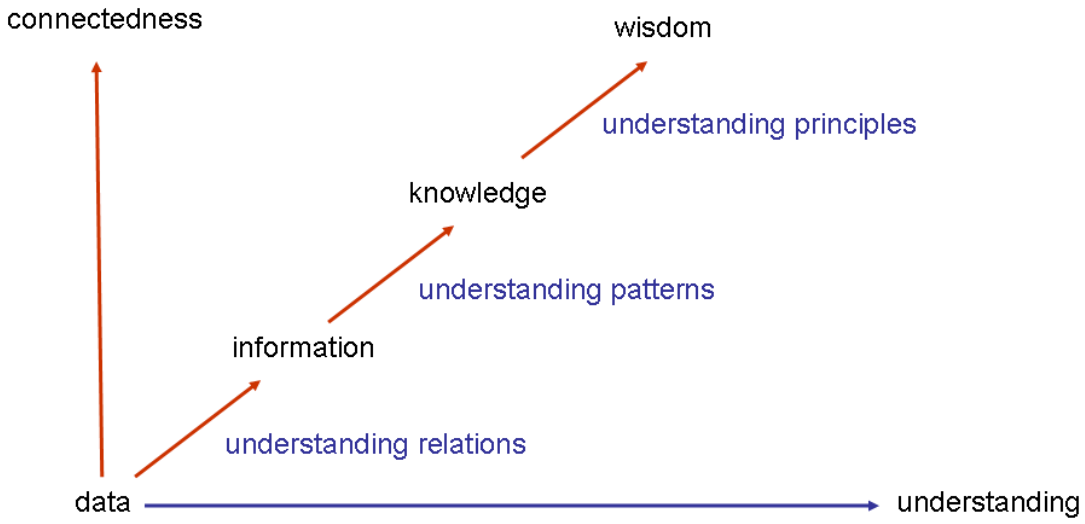


Figure 2: Data – Information – Knowledge – Wisdom.
(Source: Bellinger & Castro & Mills 2004)

According to the DIKW model (Ackoff 1989, Cleveland 1982), data are the most basic level and they come in the form of raw observations without meaning. Information adds context and meaning to data by analyzing relationships and connections. Often information is referred to as a "difference that makes the difference". Once it is clear *how* the information can be used and it helps the owner to make decisions and act, in other words, it has become useful, it is knowledge. Using, sharing and enriching knowledge leads to wisdom, which, beyond knowledge, allows the owner to know *when* and *why* to use of her/his knowledge. As Ackoff (1989) pointed out, the DIKW model is valid on another axis too: temporal nature. While information has a short life-span, wisdom is "permanent".

Information theory considers data as registered signals. Once the data is mentally processed in a context and interpreted, it becomes information. This process is called decoding in general communication system theories (see Chapter 2.1.3.3) and cryptography is fully focused on it. When dealing with encoded signals, encryption and decryption algorithms, the major difference between data and information becomes obvious. If the information can be used by the receiver agent (based on prior knowledge), then it can be considered as knowledge. (Shannon & Weaver 1949)

By looking at the various knowledge pyramids, we can conclude that they give indications and impressions, but not precise definitions. Fricke (2009) argues that these visual representations are methodologically unsound; Tuomi (1999) points out that there is no information without knowledge so the pyramid should be upside-down; Weinberger (2010) thinks that they oversimplify this topic and miss out the creative, discontinuous, social, and cultural aspects of knowledge creation; Rowley (2007) questions the agreement on the interpretation of the pyramids. Russell goes even further and states that "no definition can be satisfactory which introduces the word "knowledge", both because this word is highly ambiguous, and because every one of its possible meanings can only be made clear after much epistemological discussion." (Eames & Blackwell 1984, p. 46) Following this argument, the next chapter goes beyond the knowledge pyramids to the area of epistemology.

2.1.1.2 Definitions

The ability to know something is a central (and controversial) part of philosophy and has its own branch, epistemology, which deals with the nature, origin and scope of knowledge. Knowledge is a controversial topic, the various epistemological approaches, such as nihilism, rationalism, positivism, idealism, pragmatism, etc., have completely different understanding of knowledge. (Kvanvig 2003, Newall 2004) Most debate in epistemology is centered around two aspects of knowledge: its relationship with justified belief and its orientation to some end.

This chapter began with Plato. He was the first to propound in the previously quoted dialogue Theatetus that knowledge is "justified belief". Many great thinkers, including Descartes, Spinoza, and Leibniz, famously developed it further. (Chrisholm 1966) Nonaka and Takeuchi emphasize that the traditional Western epistemology always kept focusing on "truthfulness" as the essential attribute of knowledge. Nonaka and Takeuchi (1995, p. 58) define knowledge by saying that "First, knowledge, unlike information, is about beliefs and commitment. Knowledge is a function of a particular stance, perspective, or intention."

Edmund Gettier argued (1963, Pryor 2004) that there are situations in which a belief may be justified and true, but does not count as knowledge. Some epistemologists have attempted to find stronger criteria for knowledge that are not subject to the sorts of counter-examples which Gettier and his many successors have produced. Most of these attempts involve adding a fourth condition or placing restrictions on the kind or degree of justification suitable to produce knowledge. After Gettier's article, for more than a decade, an enormous number of articles were published, each seeking to supply the missing fourth condition of knowledge. The ambitious project tried to figure out the "X" in this equation: Knowledge = Belief + Truth + Justification + X. Whenever someone proposed an answer, someone else would come up with a new counterexample to discredit that definition.

While the above mentioned rationalists stated that knowledge can be acquired by reasoning, empiricists, such as Descartes and Locke, said that knowledge can be obtained from sensory experiences. Kant tried to unite these two dominant epistemological approaches by claiming that knowledge can be obtained by the combination of logical

thinking and sensory experience. Hegel tried to settle the discussion too, for him the process of acquiring knowledge starts with sensory perception and completes with rationalism. (Nonaka & Takeuchi 1995) For the purposes of the current research this Kantian-Hegelian understanding will be used.

Some well-known definitions focusing on the relationship of knowledge with justified belief:

- "Knowledge is conviction based on a reason so strong that it can never be shaken by any stronger reason." (Descartes 1640, p. 64.)
- "Information is a flow of messages, while knowledge is created by that very flow of information, anchored in the beliefs and commitment of its holder." (Nonaka & Takeuchi 1995, p. 58)
- "Knowledge consists of truths, beliefs, perspectives, and concerns, judgments and expectations, methodologies and know-how." (Wiig 1993)

The classical approach points out that knowledge needs to be conserved for later reuse. E.g., Aristotle says in the Metaphysics that "Everyone by nature desires to know" which means that the more knowledge one can acquire, the better one can fulfill her/his desires. Nonaka and Takeuchi, in contrast, emphasize that knowledge is, "unlike information, about action"; it is always "to some end"; thus knowledge is forgotten once the end is achieved.

Some other well-known definitions emphasizing that knowledge is to some end:

- "Knowledge is information that changes something or somebody – either by becoming grounds for actions, or by making an individual (or an institution) capable of different or more effective action." (Drucker 1989)
- According to Philips (2002, p. 9), "knowledge is the capacity to act in a context."

Considering that this research is focused on business organizations, a short, catchy, and very pragmatic wording works the best. For this reason, the author prefers to use the definition created by Philips and in the rest of the dissertation knowledge will be defined as "the capacity to act in a context".

2.1.1.3 Types of knowledge

As there is no universally accepted definition of knowledge, not surprisingly, there are numerous classifications of the knowledge types. This chapter discusses the two most important ones. The basic understanding of the terms introduced in this chapter will be necessary for the current research.

A priori vs. a posteriori

Two kinds of knowledge can be distinguished based on their relationship with experience: a priori ("from what comes before" in Latin) and a posteriori ("from what comes later" in Latin) knowledge. A proposition is known a priori if it can be derived through reasoning without perception, observation or experimentation. For example, "two is not equal to three". By contrast, a posteriori knowledge can be created or justified only by some reference to experience. For example, "it is raining outside". A posteriori knowledge is, therefore, also called empirical knowledge.

There has been a long standing disagreement between rationalists and empiricists about the existence of any non-trivial a priori knowledge. While rationalists claim that there is a priori knowledge, empiricists hold that all knowledge is ultimately derived from sense experience. A priori propositions do not constitute "real" knowledge – argues David Hume, but for the sake of completeness he adds that "though experience be our only guide in reasoning concerning matters of fact, it must be acknowledged that this guide is not altogether infallible, but in some cases is apt to lead us into errors." (Hume 1748)

The empiricist view, the importance of experience, will play a key role in the two case studies of this research.

Tacit vs. codified

"Tacit knowledge is personal, context-specific, and therefore hard to formalize and communicate." (Nonaka & Takeuchi 1995) Explicit or "codified" knowledge, on the other hand, can be articulated, transmitted and even stored. The Hungarian polymath Mihály

Polányi states that learning is a personal process, where previous knowledge influences how new knowledge can be gained. Therefore all knowledge has a tacit component and explicit knowledge, that can be expressed and easily transmitted, represents only the tip of the iceberg of the entire body of knowledge. As Polányi (1964, p. 4) puts it, "We can know more than we can tell". The iceberg metaphor (Figure 3) is frequently used to illustrate tacit and codified knowledge: the part of the iceberg which is visible above the sea level is codified, while there is a huge tacit part underwater which is not in our sight.

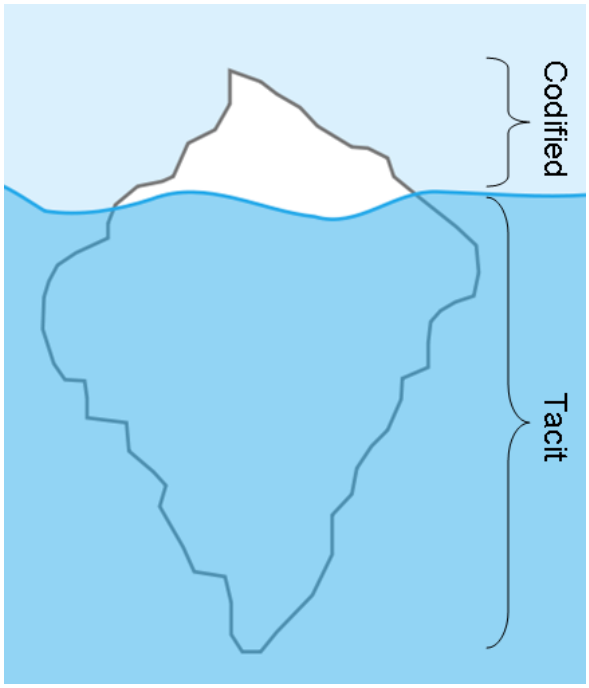


Figure 3: Tacit vs. codified knowledge (Source: own figure)

Polányi's idea was a breakthrough, because in traditional epistemology, knowledge is absolute, the subject and the object of perception are separated, human beings as the subject of perception acquire knowledge by analyzing external objects. In contrast, Polányi was very skeptical about objective knowledge, he believed that knowledge acquisition is a very human activity, the people gaining the knowledge are always involved with their own personality, feelings, and prior experience. This is what he called "indwelling". The Enlightenment tried to separate personal involvement from objective science, but for Polányi this is not possible, since indwelling is integral to the process of knowing. (Morton 2002)

Nonaka and Takeuchi (1995), who built on Polányi's ideas, even concluded that knowledge means different things to different people; therefore the commonly used definition of knowledge as a justified true belief becomes useless in practice. They argue for a revised definition, "Knowledge [is] a dynamic human process of justifying personal belief toward the 'truth'" (Nonaka & Takeuchi 1995). Table 1 shows the two types of knowledge:

Table 1: Tacit vs. explicit knowledge (Source: Nonaka & Takeuchi 1995, p. 61.)

Tacit Knowledge (Subjective)	Explicit Knowledge (Objective)
Knowledge of experiences (body)	Knowledge of rationality (mind)
Simultaneous knowledge (here and now)	Sequential knowledge (there and then)
Analog knowledge (practice)	Digital knowledge (theory)

Transmission costs of codified knowledge is an interesting topic. On one hand, since it can be well articulated and stored, the marginal costs of transmission may be low. This is why knowledge management practitioners describe codified knowledge with a catchy adjective, "slippery". On the other hand, understanding codified knowledge may require prior (codified and tacit) knowledge and in its absence the transmission costs can rise significantly. Distance in terms of time, space, culture, and social environment are factors which can complicate the transmission. This phenomenon is commonly described as "what is codified for one person may be tacit for another". (Cowan & David & Foray 1999)

In contrast to this tacit vs. codified classification, Leonard and Sensiper (1998) describe knowledge as a continuum: "Knowledge exists on a spectrum. At one extreme, it is almost completely tacit, that is semiconscious and unconscious knowledge held in people's heads and bodies. At the other end of the spectrum, knowledge is almost completely explicit or codified, structured and accessible to people other than the individuals originating it. Most knowledge of course exists between these extremes. Explicit elements are objective, rational, and created in the 'then and there', while the tacit elements are subjective experiential and created in the 'here and now'".

The separation of tacit and codified knowledge is sometimes described using different terminologies. For example, while Nonaka and Takeuchi (1995) use the terms analog and digital, Hildreth & Wright & Kimble (1999) refers to hard and soft knowledge, Conklin

(1996) separates formal and informal knowledge. He considers formal knowledge as that which is found in books, manuals, and documents, and which can be easily shared in training courses. Informal knowledge is described as the knowledge that is gained in the process of creating formal knowledge. Important to know that these are variations of the same ideas. The distinction between tacit and codified knowledge as well as the separation of a priori and a posteriori knowledge can be traced back to the fundamental philosophical conflict between the Autopoietic and the Representational View (Von Krogh & Roos 1996) – as shown in Table 2:

Table 2: Autopoietic vs. representational view (Source: Hildreth & Kimble 2002)

Autopoietic View	Representational View
Knowledge is creational and based on distinction making in observation	Knowledge is representation of a pre-given reality
Knowledge is history dependent and thus is context sensitive	Knowledge is unchanging, universal, and objective
Knowledge is not directly transferable	Knowledge is directly transferable

2.1.1.4 Nature of knowledge

Knowledge is multifaceted; in different contexts it has different natures. (Bonifacio & Camussone 2003) Consequently, it can play various roles in the economic system as well. (Clancey 1997)

Knowledge as a product

According to Davenport and Prusak (2001, p. 41), knowledge is exchanged in markets, just as other goods. There are buyers and sellers in the knowledge market, units of knowledge have a price, and the participants in the transaction aim to maximize their profit. Knowledge has a value, and therefore a positive price, because it can reduce unwanted uncertainty. In many cases, no cash is exchanged in the transaction; therefore we can say that the transactions take place in a so-called pseudo-market. Knowledge is precious; the owner of the knowledge is going to share it only if she/he expects compensation of at least equal value. Next to the buyers and sellers, Sousa (2008) and Zook (2004) discuss the role of the brokers who connect the sellers and the buyers.

According to Davenport and Prusak (2001, p. 46), there are three types of payments in knowledge markets: reciprocity, fame, and altruism. *Reciprocity* means that the sellers share their knowledge expecting that the buyers will help them in the future. This is doing favor in exchange for another favor. This relationship can be less direct more easily (e.g., asynchronous in time or geographically distributed) if money plays a role. *Fame* is crucial in setting the price for knowledge. Famous people, i.e., sellers who are known for being knowledgeable, can get a higher price for their knowledge than sellers who are considered novices in the given area. Loyalty or having been employed at a company for a long time are less decisive factors than knowledge and experience. Employees are willing to do more (e.g., to work overtime hours) to increase their fame. The importance of relationships is emphasized by the Social Exchange Theory, particularly by Nahapiet and Ghoshal (1998), who pointed out that "social capital is created and sustained through exchange… social capital facilitates exchange". This can develop into a "clique market", where "all parties have such credibility that all exchanges occur without hesitation" (Sawyer & Eschenfelder & Heckman 2000, p. 196.) Fame, or reputation in other words, plays a crucial role in the price mechanism of knowledge markets. In contrast to the market of tangible goods where price is a function of the value of goods, in the knowledge market price is decided by reputation and reputation is the function of the value of goods. (Yamamoto & Ohta 2001) *Altruism* can be based on the desire to help one's company or the simple wish to help others. E.g., elderly people might be interested in sharing their knowledge just to help next generations. (Rioux 2000)

Reciprocity, fame, and altruism work together; they are interwoven in most knowledge exchanges. There is, however, another important component is these situations: trust. According to Mishra (1996) "it involves a willingness to make oneself vulnerable to others and involves trust in various facets of another party, namely: (1) trust in their competence, (2) trust in their openness and honesty, (3) trust in their intensions and concerns, and (4) trust in their reliability". According to Doney and Canon (1997) and Hámori (2004), reliability and benevolence are the most important factors. Trust has to be visible, knowledge sharing has to be appreciated by management, and it has to be present in the leadership as well. (The trust factor explains why computer systems on their own do not offer a functional knowledge management solution. Of course, based on this idea, a new feature, the so-called ratings have been introduced to these content/knowledge management computer systems in order to address the trust issue.)

According to Davenport and Prusak (2001, p. 54.), knowledge markets function at a very low efficiency. There are three reasons for this:

1. Lacking information

   Information is very often difficult to locate, the value of the knowledge is hard to estimate, and the benefits are uncertain.

2. Asymmetry of knowledge

   Some groups may have a considerable amount of knowledge, while others may have almost no knowledge in a given area. In extreme cases, this asymmetry can even prevent knowledge exchange from taking place.

3. Immobility of knowledge

   Most buyers are willing to expend only a certain effort in order to get new knowledge. This limits knowledge exchange.

Free market economies have their limitations; e.g., monopolies can destroy free competition. Per the above concept, if knowledge behaves like regular goods, then monopolies should play the same role in the knowledge market as in other markets. Experience shows that, as expected, monopolies of knowledge, i.e., individuals or groups with a very big amount of knowledge, can evolve and these monopolies are in a position to set, literally command, very high prices for their knowledge.

Trade barriers constitute similar limitations. Anti-knowledge sharing corporate culture or missing or incomplete (computer) infrastructure can be barriers in knowledge markets.

Knowledge as a quasi-public good

In economic theory, private and public goods differ in two main characteristics: While cost of providing private goods increases at least proportionately to the number of consumers, it stays unchanged for public goods. In case of private goods, anybody can be excluded from the use of the goods. In contrast, public goods are non-excludable, i.e. if it is available for one person, it is also available for everybody. (McCain 2007, Swedborg 1994, Morrissey & te Velde & Hewitt 2002)

Knowledge has some special characteristics that distinguish it from other kinds of goods and services (McCain 2007):

- In most cases knowledge cannot be sold alone, but only jointly with some medium of communication.
- Each knowledge product is unique and not homogenous.
- Fixed costs for such products are high, since only the costs of the medium of communication are variable.
- They are easily and cheaply imitated, hence there may be a problem of insufficient incentive to produce them.
- Intellectual property rights are instituted in some cases to provide incentives.

For these reasons, knowledge is a quasi-public good defined as: "The cost of providing the good increases less than proportionately to the number who benefit from it and there are some difficulties in excluding those who do not pay from the benefit of the good." (McCain 2007)

Knowledge as an asset

Knowledge, more precisely a posteriori knowledge, can be considered as an asset, since it has all the three characteristics (Godfrey et al. 2010, Henderson & Peirson 2007) which are necessary for assets:

- Services can be offered based on it for future potential benefits. (We have seen that knowledge helps in decision making.)
- The organization can control it. (Knowledge processes are discussed in detail in Chapter 2.1.3)
- Is the result of past transactions. (This is only true for a posteriori knowledge.)

Knowledge is an intangible asset that can be repackaged into knowledge-based products and services. (Cleveland 1982) "Unlike material assets, which decrease as they are used, knowledge assets increase with use: ideas breed new ideas, and shared knowledge stays with the giver while it enriches the receiver." (Davenport & Prusak 2000, p. 16.) Knowledge is the only thing that multiplies when you divide it.

2.1.1.5 The value of knowledge

As the value of knowledge has entered the focus of many management studies, organizations have tried to measure knowledge in various ways, with limited success. Generally speaking, there are three approaches to determine the value of knowledge based on asset valuation in accounting theory (Godfrey et al. 2010): 1) The value of knowledge is calculated based on the cost of creating/acquiring it. 2) The value equals to the actual market price. 3) The present value of the knowledge is determined by the future benefits it can generate. All three approaches often miss the mark because they treat knowledge as a conventional asset without taking into consideration its special nature.

Historic cost based evaluation has the benefit that the calculation is easy. Disadvantages are that the price paid for certain knowledge artifact may not indicate correctly its current value. (Ijiri 1971)

Another approach is the concept of knowledge markets introduced by Davenport and Prusak (2001, p. 41). In this model knowledge is exchanged in markets, just as other goods and the price is determined by supply and demand. Knowledge is not defined in terms of its content and intrinsic value, but rather by its exchange value. If knowledge has a market value, then companies with more knowledge have a higher market value. This concept is underlined by Tobin's q, which has been defined as the ratio between the market value and replacement cost of the company's assets. (Tobin 1969) Similar to Tobin, several approaches have been created to measure the intellectual capital (IC) of an organization, just to name few: Skandia Navigator (Edvinsson & Malone 1997), Value Chain Scoreboard (Lev 2001), IC-Index (Roos et al. 1998), Value Added Intellectual Coefficient (Pulic 2000), Intangible Asset Monitor (Sveiby 1997), and Balanced ScoreCard (Kaplan & Norton 1992). Even though intellectual capital (IC) is defined broader (covering human, structural and customer capital) than knowledge, the various IC measurement approaches underline the economic value of knowledge.

The knowledge market raises an interesting point. If only the market value matters, then it is possible that the intrinsic value differs significantly from the exchange value. The prior definition, i.e., knowledge is justified belief, cannot be assured anymore, because being

true and factual are intrinsic values. Consequently, the subject of the exchange may or may not be knowledge; possibly it is "just" information or data.

The approach based on calculating the present value from future benefits is a theoretically attractive method and net present value calculation has an extensive literature. (Godfrey et al. 2010, Henderson & Peirson 2007) On the other hand, contribution of knowledge assets to future benefits is hard to measure.

Some claim that the best way to measure the value of knowledge is to see how it affects business processes – e.g., by solving a problem it reduces expense, or by producing information that closes a sale. This approach is based on the pragmatic branch of epistemology.

Regarding the value of knowledge, besides the market exchange value and the intrinsic value, perceived value has to be mentioned as well. Given all the soft, hardly quantifiable factors influencing the value of knowledge and possible information asymmetry among parties, there can be a significant difference between the values of knowledge perceived by different economic actors. In cases where there is no benchmark for the price of the knowledge, this subjective perception can determine it.

Boisot (1998) takes another approach by claiming that the value of knowledge changes over time. He introduces the concept of Information Space (or I-Space), a model with three dimensions: codification, abstraction, and diffusion. Knowledge can be moved along these three dimensions, but typically knowledge evolves from uncodified personal knowledge (e.g. idea), to codified proprietary knowledge (e.g. patents in applied research), then to diffused codified knowledge (e.g. tools or publications), and ultimately to diffused uncodified knowledge (common sense). The following Figure 4 uses the above mentioned examples to show the value of knowledge changing over time.

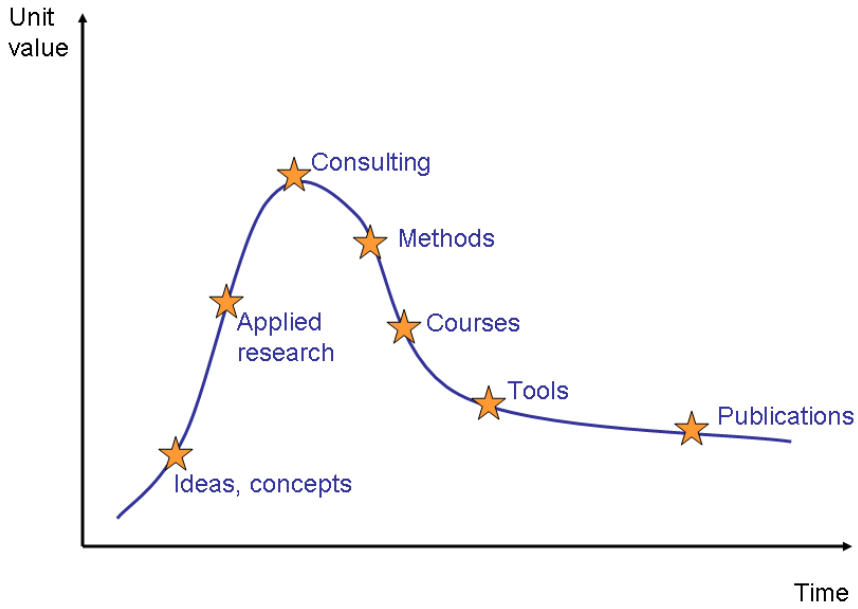


Figure 4: Value of knowledge changing over time (Source: Skyrme 2001, p. 23.)

2.1.1.6 The role of knowledge in the economy

Knowledge plays multiple roles in the economy, especially in our age which is often referred to as the Information Age. At the micro economic level, the knowledge-based theory of the firm, which considers knowledge as the most strategically significant resource of a firm, is widely accepted. (Kogut and Zander 1992) This chapter discusses some fundamental ideas about knowledge in the economy organized by some key economic aspects. These items are not directly used in the case studies of this research, but in the opinion of the author, are absolutely necessary to be aware of to some extent to understand the reasons for the immense efforts the two investigated organizations invest in knowledge management. Since it is not possible and necessary to discuss all economic aspects, and not in sufficient depth, this chapter focuses on selected views in a nutshell.

Knowledge and the market

Regarding the role of knowledge in the market, Hayek (1945) developed a complete theory. He argued that prices coordinate how local and personal knowledge is shared. No superior power or government is necessary; the complicated market system will function through a principle of spontaneous self-organization. He coined the term catallaxy to

describe a “self-organizing system of voluntary co-operation.” (Hayek 1936) Price signals on the market lead each economic decision maker to decide how and when to communicate knowledge in order to reach market equilibrium. (Hayek 1945) For Loasby, the market system can be seen as “a means of organizing the search for knowledge, [which] operates by a system of conjecture, criticism ... and testing ...”, in other words, the market demand will judge the value of the knowledge formulated in the supply. (Loasby 1993) This is in line with Schumpeter’s (1934) argumentation that market competition can be seen as a process of knowledge accumulation.

Simon (1957) disagreed with Hayek and emphasized that the knowledge processing capabilities of the economic agents are limited and they may not have enough time to make optimal decisions, just good enough ones to satisfy their needs. Popper (1972) claimed that this is not just a question of not having enough time or skill, because all human knowledge can be wrong; the individuals can never know to what extent they are right or wrong. Similarly, Akerlof (1970) didn’t believe in optimal choices either. He claimed that informational asymmetries exist because sellers know more about products and services than buyers, the board of a company knows more than the share holders, etc. Grossman-Stiglitz (1980) had even stronger doubts about optimal market choices. They found a paradox between the fact that prices contain all information and the incentive economic agents have to acquire more information.

Another interesting aspect of the relationship between knowledge and the market is the fact that knowledge drives the creation of new goods, services, and knowledge itself. As described under the topic of innovation, typically “the winner takes it all” principal is dominant in competition. This results in fast and sudden changes in the structure of the market. (Garnett 1999, Neef & Siesfeld & Cefola 1998) This fierce competition is global, since there are no geographical barriers to knowledge. This also implies a somewhat decreased economic importance of nation states. (Allee 2003) This can be observed very clearly in virtual, Internet-based markets such as experts-exchange.com or innocentive.com.

Knowledge and production

Knowledge can be considered an asset. It can be a resource just like humans, time, or minerals. With the advance of information and communications technology (ICT), knowledge has increasingly become a key resource. The automobile and high-tech industries highlight this point: "intangible inputs that are dependent upon employee knowledge and skills - creativity and design proficiency, customer relationships and goodwill, innovative marketing and sales techniques - account for an average of 70 percent of the value of automobiles, and 85 percent of the value of high-technology goods such as microchips or CDs." (The Economist 1996)

All societies recognize this point; this is why education is often state-subsidized. Besides education, knowledge can be conceived of as a stock of results achieved by intentional investments in research activity.

Knowledge and labor

The spread of the knowledge economy requires the rise of the knowledge workers, as defined by Drucker (1959). These workers, who handle knowledge-intensive tasks daily, become very specialized. Consequently, the labor market gets fragmented and access to the right tacit knowledge poses a challenge for companies, which means that companies are looking for various ways of codifying knowledge. The level of codification of the knowledge, however, is determined by codification and transactions costs (search and entry frictions). Less codified knowledge usually means higher demand for personal communication and labor.

As discussed earlier, there is codified and tacit knowledge. The two can be converted into each other. Based on market principles, one can say that knowledge is not articulated because, relative to the state of demand, the cost and supply price are too high. As a result, this piece of knowledge may remain partly or wholly uncodified. To complicate the matter, if for some knowledge we do not even know how to begin the process of codification, then the price calculation can hardly be undertaken. Still, generally speaking, the extent to which knowledge is codified is determined by incentives: the costs and benefits of doing so. As a result, the market can reach multiple equilibria. If the rate of return for

codification is low, a large community of people possessing the tacit knowledge will rise. In this case, there will be a labor market that can be used to store and transfer the knowledge from economic agent to economic agent. Of course, the presence of a reliable labor market as a way of transferring knowledge further reduces incentives to codify and results in a market equilibrium. If, in the opposite scenario, there are high returns to codification, more knowledge will be codified. This will decrease the value of the labor market as a means of maintaining and distributing knowledge. As a reinforcement, the relative value of codification increases further. This will result in another market equilibrium. Based on these two examples it is easy to see that there is an infinite number of possible equilibria: one with significant resources devoted to codification and one with few resources dedicated to this activity, and all the "shades of these two extremes".

In contrast to this infinite number of possible equilibria, in a Nash equilibrium, players' rationality is mutual knowledge. From an initial state of distributed knowledge among economic agents the economy converges to a stable and unique distribution. Therefore there is only one equilibrium. (Jovanovic & Rob 1989)

These market mechanisms are impacted by numerous factors such as labor mobility, regional demographics, politics, and cultural differences.

Knowledge and innovation

In a knowledge-based economy, the primary area of competition is innovation (because "the winner takes it all"), not prices (Skyrme 2001). Knowledge is the main component of innovation and ownership of an innovation may provide monopoly pricing power. However, unlike monopolies in standard economic theory, innovation-based monopolies are temporary, because new innovations make old innovations obsolete. The phenomenon of knowledge spillovers shows that knowledge is only partially excludable, because knowledge created by one party may sometimes be used by another one without any or less compensation. To compensate the huge efforts in innovation, intellectual property rights is a method to prolong the monopolies of the innovators.

Knowledge and intellectual property rights

According to the traditional view of knowledge, originated from Plato, knowledge is objective – it exists; human beings can only discover it. This implied an important question for economists throughout several centuries: If knowledge is objective, should not then everyone just have unlimited and free access to it? In economic terms: is knowledge or should knowledge be a public good? Arrow (1962) is the most famous advocate of this argument.

Originating knowledge is costly, but reusing/copying is much cheaper. In general, imitation is less costly than original work; thus the imitators can undercut the originator. In effect, the imitators need not bear any of the fixed cost of the original information product, but only the variable cost of the media. This is an incentive problem to originate knowledge. Too few resources may be allocated to the production of information products, in the absence of some special provision. Intellectual property rights, e.g., patent or copyright, are a special provision designed to remedy the incentive problem. The law gives the originator of an information product some exclusive right to control use or sale of the information product, regardless of the media in which it is expressed.

The openness of knowledge depends on the medium of transmission. Developments in ICT, e.g., wide use of Internet, have made transmission cheaper and more efficient. This results in knowledge becoming a more public good. Modern ICT hinders property rights enforcement. Both lawmakers and economists have trouble keeping abreast with the rapid pace of development, such as peer-to-peer file sharing, open source development, etc.

Knowledge and economic growth

Some claim that the effect of knowledge is ambiguous. It has advantages (our understanding of the world gives us material benefits and happiness), and disadvantages (knowledge can make our lives more complicated). (Leet 2004, p. 1)

Schumpeter (1939), Kondratieff and many others successfully related innovation, i.e. rapid growth in knowledge, to economic growth. Both agreed that there are "long waves of technological change" which make current and future economic prosperity possible. This

makes knowledge a strategically important source of competitive advantage (Nonaka 1994, Grant 1996, DeCarolis & Deeds 1999).

Before the infamous dot-com crisis, more and more people started to believe that knowledge would stimulate forever unlimited growth. This "New Economy" (sometimes called Knowledge Economy or Internet Economy) was described as a knowledge-based economy where economic growth, low inflation, and high employment can co-exist. (Mokyr 2002) As foundation for these ideas the Endogenous Growth Theory (a.k.a. the New Growth Theory) was used. The main promoter of this theory, Romer (1990) argued that while the rate of return for physical capital is decreasing, it is increasing for human capital. Therefore depending on the economic choices a country makes, a steady growth rate can be maintained. The crisis not only ended the dot-com hype around the year 2000, but proved that these speculations about the world economy were unrealistically optimistic. At the same time, high correlation (87%) has been shown between level of economic development (measured in GDP) and level of knowledge (measured the Knowledge Economy Index of the World Bank). (World Bank 2009)

2.1.2 Knowledge Management

Knowledge management means organizations' attempts to acquire, coordinate, diffuse, create, and utilize knowledge. (Brint 2007, Williamson 2000) When something is to be managed many people feel that in order to do this, it must be quantified, counted, organized and measured; (Glazer 1998) it must be possible to be build, own, and control it if its value is to be maximized (Allee 1997). For this reason, critics argue that knowledge in itself cannot be managed and that KM is just another management fad. (Wilson 2002) Despite this extremist view, thousands of researchers are successfully active in the field of knowledge management, and as a result, there are numerous approaches to knowledge management. Some classic definitions emphasize different aspects of knowledge management and add important value to the above-mentioned definition:

- "Knowledge Management is the collection of processes that govern the creation, dissemination, and utilization of knowledge." (Newman 1991) Robertson as well as Swan (2000) argue further that knowledge management is about connecting people

with people and people with information to foster collaboration and community networking.

- Quintas defines knowledge management as: “the process of continually managing knowledge of all kinds to meet existing and emerging needs, to identify and exploit existing and acquired knowledge assets and to develop new opportunities”. (Gruber & Duxbury 2002)
- "Knowledge Management is a business philosophy. It is an emerging set of principles, processes, organizational structures, and technology applications that help people share and leverage their knowledge to meet their business objectives." (Gurteen 1999)
- According to Philips (2002, p. 9), “Knowledge management is the process of creating, disseminating and exploiting (re-using) knowledge to enhance business performance. It is a combination of process, people, content, and technology.”

As mentioned in Chapter 2.1.1.2, knowledge is defined as “the capacity to act in a context” (Philips 2002) in this dissertation. Similarly, for knowledge management, the Philips definition will be adopted with a small modification: “Knowledge management is the process of creating, [storing,] disseminating and exploiting (re-using) knowledge to enhance business performance. It is a combination of process, people, content, and technology.” The world “storing” has been added and the author believes that this addition does not change the original idea behind this definition and is more precise for the purposes of the current PhD research, as explained in the next chapter.

2.1.3 Knowledge management processes

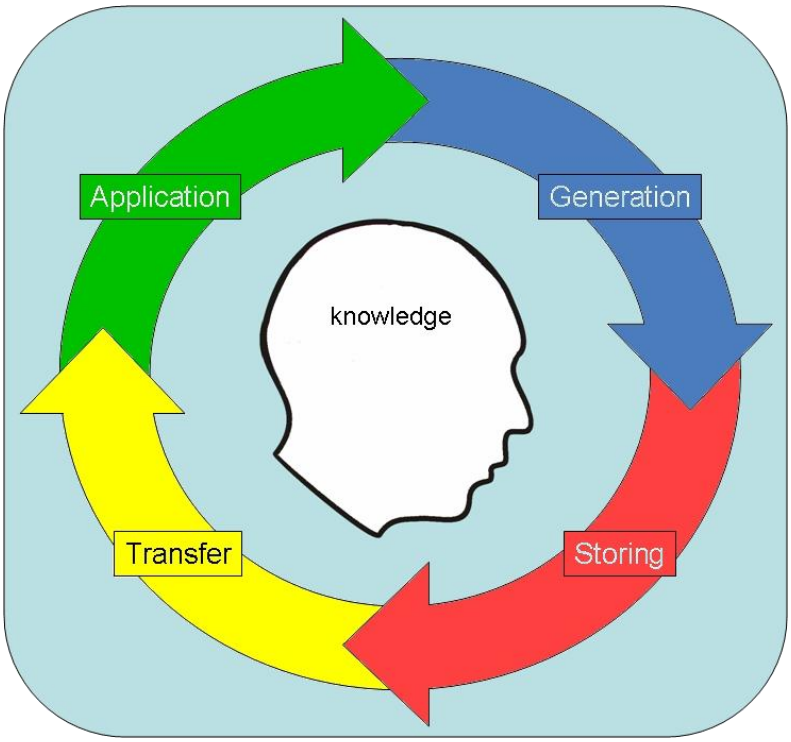


Figure 5: Knowledge management processes (Source: own figure)

Knowledge management processes, the role of knowledge in an organization have been studied in detail from many points of view: core competencies (Prahalad & Hamel 1990), organizational learning (e.g., Levitt & March 1988, Huber 1991), dynamic capabilities (e.g., Teece & Pisano & Shuen 1997), managerial cognition (e.g., Walsh 1995), organizational memory (e.g., Walsh & Ungson 1991), distributed cognition (e.g., Hutchins 1995, Madhavan & Grover 1998), intellectual capital (e.g., Edvinsson 1997), and communities of practice (Wenger 1998).

The rest of this dissertation will focus on the four principal knowledge processes in the lifecycle of knowledge assets: generation, storing, transfer, and application of knowledge. (Figure 5) There are many more interesting processes such as measuring knowledge or benchmarking (Stallkamp & Hanke 2003), but these are secondary, not necessary parts of the lifecycle of knowledge. Deciding on the number of processes is also a question of defining the granularity of the processes. For example, Probst & Raub & Romhardt (1999) defined 6 processes: Identification, Acquisition, Development, Distribution, Utilization, and Preservation. It is easy to see that this categorization is very similar to that above.

Knowledge can be created from internal or external sources. If created from internal sources, it has to be identified and developed, if from external sources, then it has to be identified and acquired. All of this in Figure 5 is referenced under the umbrella term Generation. Distribution is just another word for Transfer, Utilization is another word for Application, and Preservation is similar to Storing. Mertins & Heisig & Vorbeck (2003) defined four processes: Create, Store, Distribute, and Apply. This matches 100% with Figure 5, just as the four processes (capturing, storing, sharing, and using knowledge) listed by Davenport & Prusak (2001). The famous Fraunhofer IPK Reference Model on KM (Alwert & Ulbrich 2002) uses the same four knowledge processes and it connects knowledge processes to business processes. (See Figure 6) This connection is important for this PhD project and it will be explained in detail in the chapter about research methodology.

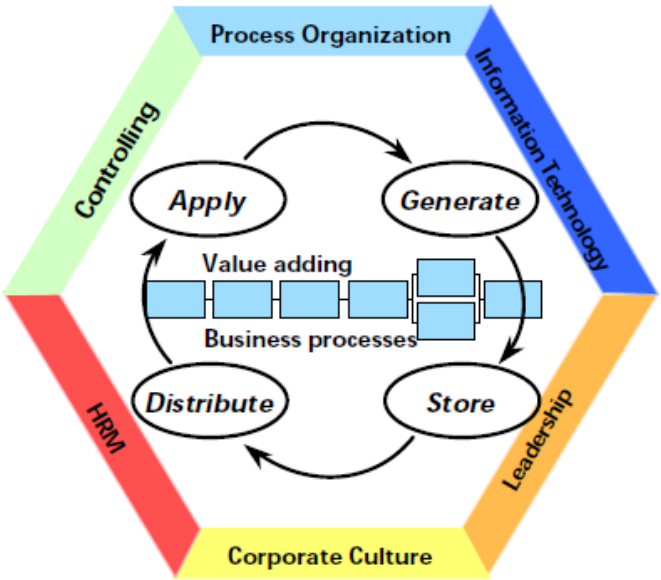


Figure 6: Fraunhofer IPK Reference Model on KM.
(Source: Alwert & Ulbrich 2002)

The author believes that four processes provide the right granularity, less than four cannot capture the whole lifecycle of knowledge and more than four gives unnecessary split of one or the other main process. As noted by Ortiz Laverde & Baragaño & Sarriegui Dominguez (2003), there is no lexical standardization regarding the naming of the processes. It is very confusing, but once the categories are compared, the differences are

trivial. For the purposes of the current research, Generation, Storing, Transfer, and Application are used.

2.1.3.1 Knowledge generation

Knowledge generation can be understood in various ways; the previous chapter already gave some examples. Whether identification of the information area, acquisition or capturing of information is part of it, it is sure that knowledge generation can be completed only if knowledge has been created in the mind of someone.

It can start with the creation of information artifacts such as text, for example, in the form of documents, email, or web pages, but it has to finish with knowledge in the mind. This last step is called knowledge crystallization and is an integral process in the creation of knowledge (Raza Abidi & Yu-N 2001), whereby expert-level "knowledge consumers" in an organization validate the quality and applicability of the acquired tacit knowledge. (Nonaka 1994, Nonaka & Takeuchi 1995)

What makes this last step possible is understanding which comes, according to Schön (1983), from reflection. Reflection occurs in action if the actors manage to observe their own actions. It requires somewhat freedom of the mind (from daily work) and a certain level of experience. Reflection can benefit greatly from being done in dialogue, either with others, e.g., with members of a community of practice (as always face-to-face situations are the most productive), or with oneself, but dialogue means articulating and making tacit understandings explicit. Once knowledge is explicit, it is ready for the next process, storing.

According to Nonaka and Takeuchi (1995) knowledge creation involves the social processes of (1) sharing tacit knowledge (2) converting this into explicit knowledge (3) justifying new knowledge (4) converting these into something tangible or concrete (5) linking new explicit knowledge to existing explicit knowledge to finally (6) building something new and innovative.

2.1.3.2 Knowledge storing

The topic of storing knowledge is very closely related to the previous chapters about the nature and type of knowledge. Recently there has been a trend towards recognizing that there is knowledge, tacit knowledge, which cannot be articulated, abstracted, codified, captured and stored, or at least with much more difficulty than codified knowledge. Traditionally knowledge storing referred to the storing of information: client presentations, training packs, marketing materials, customer data, meeting minutes, project proposals, policy documents, price lists, product specifications, competitor intelligence, research reports, etc. – in essence: documents. Others (e.g., Beckman 1999) state that organizational knowledge is knowledge captured by the organization's systems, processes, products, rules, and culture. This wider view is described as organizational memory.

This capture/codify/store approach has always been technology-dominated and generally ignored that the key attribute of knowledge is that it exists in people's mind. Once knowledge has been captured on paper or any other medium, it becomes information. The original knowledge remains in the mind of the author and the receiver of the information can create knowledge from it based on her/his own experience and interpretation. The technology-dominated approach aimed at storing knowledge. Nowadays it is widely accepted that information can be stored, which in turn can be used to create knowledge. "The more rich and tacit knowledge is, the more technology should be used to enable people to share directly that knowledge. It is not a good idea to try and contain or represent the knowledge itself using technology." (Davenport & Prusak 2001, p. 96.) This is a key point regarding storing, because it is widely asserted that within enterprises essential strategic knowledge is often tacit rather than explicit, stored within the minds of its employees. (Nonaka & Takeuchi 1995)

2.1.3.3 Knowledge sharing and transfer

Knowledge sharing is considered to be an integral part of organizational learning (Shrivastava 1983, Huber 1991, Kim 1993, Andrews & Delahaye 2000). Knowledge sharing is important as it sustains learning, but also because it supports processes of

technological innovation (Borgatti and Cross 2003; Kogut and Zander 1992; Lave and Wenger 1991; Orr 1996; Tsai and Ghoshal 1998). Furthermore, it contributes to the overall performance of the organization (Mahnke 1998). According to DeCarolis and Deeds (1999) both stocks and flows of knowledge determine the success of firms. Knowledge sharing is so crucial that "we used to say knowledge is power. Now we say sharing is power." (Pederson 1998)

In order to understand knowledge sharing, it is very useful to look at the linear communication model first. Szulanski (2000) notes that most knowledge sharing research implicitly or explicitly uses the linear communication model. This model was first presented by Shannon and Weaver (1949). In this model a message is sent by an information source via a communication channel to a destination. In that process the message is encoded by a transmitter into a signal, influenced by noise and decoded by a receiver into a message again. (Figure 7) A similar model is presented by Berlo (1960). It lists the following elements of a communication process: a communication source, an encoder, a message, a channel, a decoder, and a communication receiver. In human communication, the same person often fulfills the role of source and encoder. The same holds true for the roles of decoder and receiver. Therefore this model is sometimes referred to as the source-message-channel-receiver model (e.g., Moenaert & Souder 1990). Models like these are called linear communication models since they model the one-way flow of a message from a source to a receiver. Following Shannon and Weaver (1949), the messages transferred have frequently been labeled information. The use of a linear communication model is often allied with the view that communication is the transfer of information (e.g., Allen 1977, Moenaert & Souder 1996). Hansen (1999) goes further and distinguishes two main phases of knowledge sharing: searching and transferring. Both of these phases can be subdivided again. According to him, searching encompasses 'looking for' and 'identifying' and transferring encompasses 'moving' and 'incorporating'. This searching phase is an addition to the original linear communication model.

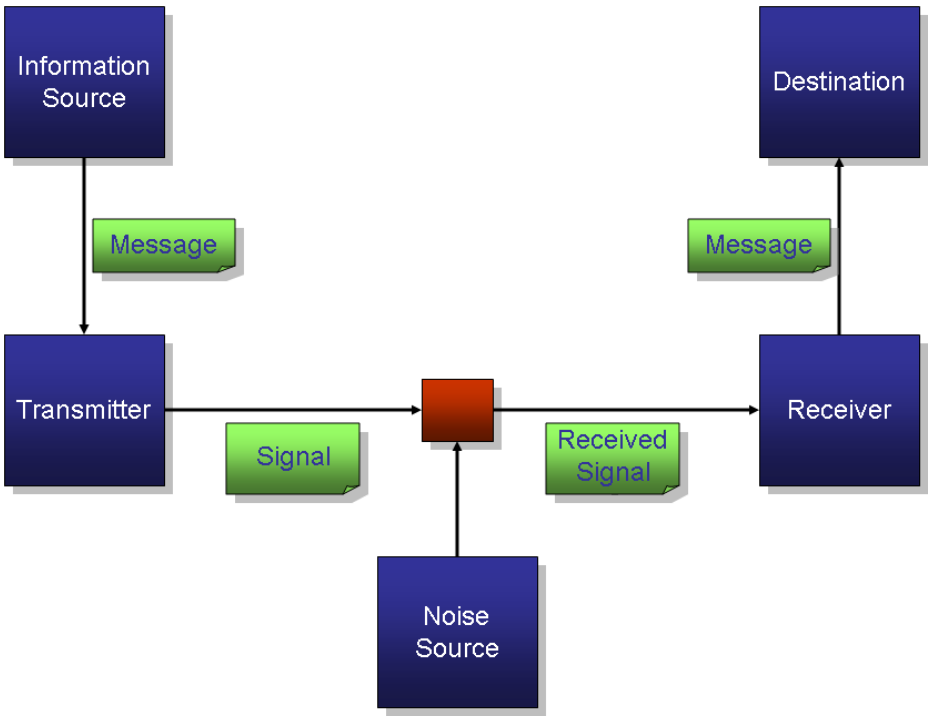


Figure 7: Schematic diagram of a general communication system (Source: Shannon & Weaver 1949).

Knowledge sharing is based on the above described exchange if information. Information becomes knowledge in the mind of the sender and the receiver, but what is transferred is "just" information. The receiver requires her/his own knowledge to interpret the incoming information and process it to be knowledge. Consequently, this process is highly dependent on the receiver's ability to appreciate new knowledge, which is a function of their "absorptive capacity" (Cohen & Levinthal 1990) Knowledge itself is, hence, bounded by the reality perception of the receiver. The main difference between this knowledge exchange and information exchange is that in case of information exchange the receiver does not generate knowledge.

Face-to-face interactions are the best examples of knowledge sharing, actually some (e.g., Pierce 2002) think that it is the only effective means of knowledge sharing. Conversations take place in unique common contexts that are built between the participants. It is this common context (shared perspective, common language, etc.) that facilitates the transfer and development of the more deeply rooted tacit knowledge. "Community members appear to need face to face contact to maintain impetus when communication is then restricted to electronic media. The face to face element increases trust and members reported feeling

they knew better their communication partners having met them." (Hildreth & Wright & Kimble 1999, p. 8.) In mobile work settings community building and awareness tools become increasingly important when dispersal in time and space creates difficulties in localizing people for face-to-face meetings (Belotti & Bly 1996, Nardi & Whittaker 2002) and makes opportunistic meetings less likely to occur (Whittaker & Frohlich & Daly-Jones 1994). In spite of the importance of spontaneous interaction, informal communication is often poorly supported by technology. Huge improvements in this area are the latest social media tools such as Twitter, Yammer, Facebook, etc.

Zeldin (1998) summarizes the role of conversation in the creation of knowledge: "Conversation is a meeting of minds with different memories and habits. When minds meet, they do not just exchange facts: they transform them, reshape them, draw different implications from them, engage in new trains of thought. Conversation does not just reshuffle the cards: it creates new cards."

Nowadays alternative forms of conversation are available: email, online forums, blogs, wikis, etc. Clearly, these forms lack some of the richness of face-to-face conversations. As discussed before, tacit knowledge is personal, context-specific, hard to express, formalize and communicate. (Polányi 1966, Nonaka 1994) Nevertheless, they have the benefit that the information captured with these technologies can be accessed by millions of people.

While this chapter has introduced the topic of knowledge sharing, later chapters will elaborate on the motivational aspects of knowledge sharing, define knowledge sharing patterns and eventually describe the management of these patterns.

2.1.3.4 Knowledge application

The process of knowledge application links back to Philips' definition of knowledge: "knowledge is the capacity to act in a context." (2002, p. 9) When knowledge is applied, it is used to make decisions, to perform certain actions. In other words, if the knowledge which has been created, stored and shared is not applied, the main benefit is missed. As Markus (2001) pointed out, application of the knowledge is the real source for competitive advantage. In most organizations there is a gap, called "knowledge application gap"

(Malhotra 2003) or knowledge-doing gap (Pfeffer & Sutton 2000), between the input side of KM (creation) and the output side (improved performance). Davenport & Prusak (2000) explain this gap by risk aversion, lack of time or lack of trust in the source. These are, obviously, main targets of KM initiatives.

Senge (1990) pointed out that mental models play a decisive role in knowledge application. He defined mental models as "deeply ingrained assumptions, generalizations, or even pictures and images that influence how we understand the world and how we take action". (Senge 1990, p. 8.) This means that two individuals may process the same knowledge in a different way based on their personal mental models. This processing is sometimes called re-contextualization of knowledge, which is necessary if the context was lost in the knowledge storing phase. (Ackerman 1996, Lansdale 1988)

The process of knowledge storing allows knowledge reuse, which is a repetitive form of knowledge application. In contrast to the obvious benefits of knowledge reuse (saving of time, ensuring quality, etc.), Cheung et al. (2008) argued that if the task at hand is qualitative and innovative, reuse of existing knowledge inhibits a truly creative person. For routine and predictable tasks the application of knowledge can even be enforced by embedded the knowledge into systems (workflows, business rule management systems, etc.) and procedures.

As discussed earlier, thanks to the special nature of knowledge, when knowledge is applied, new knowledge may be created. This closes the cycle.

2.1.4 Knowledge Management and Information Technology

Knowledge management can be approached from three different perspectives (Tabije 2007): The organizational perspective deals with organizational structures and solutions to enable a knowledge sharing culture. The ecological approach investigates the environmental aspects of knowledge management. The techno-centric view focuses on technology which can support knowledge management. Information Technology solutions belong to this techno-centric view.

This chapter is not going to mention all the IT tools available to support knowledge management. It is more useful to discuss the most widely used KM tool, the portal, but that in more detail, analyzing how the tool can support various aspects and processes of knowledge management.

This analysis follows the methodology introduced by Marwick (2001, p. 1.) for the evaluation of the knowledge management capabilities of IT solutions based on Polányi's (1966) categorization of knowledge (Smith 2003). This is combined with the four principal knowledge processes in the lifecycle of knowledge assets: generation, storing, transfer, and application of knowledge, as described in Chapter 2.1.3. The following paragraphs describe enterprise portals in terms of these four processes.

Knowledge generation can include, as mentioned before, tacit and explicit knowledge. Baroni & Tavares (2001) showed that "explicit knowledge and tacit knowledge are only conceptual landmarks in a continuum space. Pieces of cognition are continuously traveling among these categories." While knowledge generation takes places in the mind through crystallization, reflection and understanding, as mentioned before, Nonaka (1995) stated that "the key to knowledge creation lies in the mobilization and conversion of tacit knowledge". Enterprise portals can support all knowledge conversion processes: socialization (tacit to tacit), externalization (tacit to explicit), combination (explicit to explicit), and internalization (explicit to tacit). (Nonaka 1995) For example, externalization is best facilitated by features allowing the creation of documents, notes, and portal pages via rich document and content management functionality. However, internalization can only be handled by the human mind. IT solutions such as the portal can make a huge amount of data interpretable (thereby creating information), but knowledge can be created only by human interaction. The strength of the portal is not the process of internalization itself, but all the processes which support it.

The most fundamental functionality in enterprise portals which facilitates knowledge storing is the portal database. This technical infrastructure layer of the portals makes sure that all the content is stored, can be backed up, archived, and restored.

Knowledge sharing or transfer can be technically enabled by the portal in various ways. Enterprise portals offer role-based access to information, which means that the right people

get access to the right content in a navigation structure which fits this purpose the best. Another portal technology is content publishing, which allows distributed editing and role-based publishing of content. This means that knowledge can be transferred perfectly targeted to the right audience, resulting in the damming of the information flood. Furthermore, enterprise portals can combine push and pull techniques, for example, end users can request access to certain information (pull), but they can be informed via automatic email notifications (push) as well.

A good example how enterprise portals can support knowledge application is the functionality to combine business intelligence (reports, dashboards, etc.) and transactional portlets in one portal page. This helps the end users to get to a certain understanding and immediately apply it by executing some business transactions. Portals nowadays offer business process and rules management functionality too. In this scenario the application of knowledge does not fully depend on the end user, because some of the knowledge is already embedded in the processes and rules. Another aspect of knowledge application is usability of the portal. Portals process and present structured (ERP, CRM, etc.) and unstructured (web pages, emails, Microsoft Office documents, etc.) information. Combining, aggregating and presenting it in an easy-to-consume format is the job of the portal. Knowledge workers may engage themselves in very heterogeneous activities and for each activity the presentation requirements may differ. Ideally for each task the best user interface is selected, which supports knowledge application the best. This means that the portal becomes part of a very complex user interface mix including rich clients, rich Internet applications, etc.

Enterprise portals have become very complex tools, in case of some of their features it is not even easy to separate the four principal knowledge processes. For example, interpersonal collaboration functionality supports knowledge generation, transfer, and if the communication is captured, storing as well. The most widely used collaboration solutions (or groupware solutions) include email, online meetings, application sharing, instant messaging and expertise location (in other words, company yellow pages or who-is-who).

A very important strong trend in this context in the portal industry is the spread of social software based on web 2.0 technologies in order to improve user participation and create

user-centered design. Before this phenomenon, content was created in a centralized form, by few authorized users. Web 2.0 online communities, in the form of blogs, video sharing, wikis, mashups, etc., aim at building content collaboratively (this technique is called "wisdom of crowds"). For instance, the topic of taxonomies shows how this trend has changed enterprise portals. Web 1.0 favors taxonomies, where the authorized content creators categorize the information. Web 2.0, on the other hand, introduces content tagged by the user, so-called folksonomies, which is clearly a more complex decentralized knowledge process.

2.1.5 Knowledge Management and Culture

The term "knowledge sharing culture" is widely used in the literature, however, because of the above distinction between knowledge sharing and knowledge exchange, the author prefers to use the term "knowledge management culture". This does not limit the discussion to a culture which promotes volunteering. The goal is to establish a culture which supports knowledge management voluntarily or based on mutual benefit.

As Fitz-Enz (1997) pointed out, "Organizational culture is an often neglected dimension of organizational capability because it is largely operating at an implicit level. And yet the organizational culture becomes even more important in knowledge-intensive organizations where a significant part of the organization is in people's minds."

Knowledge management culture is a culture which helps an organization exploit its ability to utilize all of its employees' knowledge. It has three components:

- *Positive attitude to knowledge*: employees are fast thinkers, they are intellectually open, they have the opportunity and willingness to do research, and the management appreciates knowledge creation.
- *Lack of blocking knowledge*: employees are supportive of the organization, and they are not afraid of losing their jobs after sharing their knowledge.
- *Fit of the knowledge management program with the organizational culture*: The expected behavior in the knowledge management project should not be in conflict with culturally determined behaviors.

According to Davenport and Prusak (2001, p. 165.) the link between culture and knowledge management is very fundamental: organizational culture is factor number 1 in determining the success of a knowledge management project. Knowledge management can be most effective in a supportive culture. For convenience, this is called knowledge management culture. This chapter is going to describe this knowledge management culture and the traditional culture of a virtual organization.

Smith and McKeen (2001) summarize the differences between traditional and knowledge management cultures – as shown in Table 3. (Smith and McKeen call the traditional culture "hierarchical" and the knowledge management culture "knowledge culture", which are just other names for the same ideas.)

Table 3: Traditional vs. KM culture (Source: Berndt 2004, p. 108.)

Traditional culture	Knowledge management culture
Limited information distribution	Wide information distribution
Many management levels	Few management levels
Uneven responsibility	Shared responsibility
Rules based	Principles based
Structured	Unstructured
Risk adverse	Able to take some risks
Inward orientation	Outward orientation
Occasional training	Continuous learning
Financial focus	Marketing focus
Political	Open

To foster a knowledge-sharing culture, an organization needs planning, top-down support as well as effective, dynamic communication. A systematic approach to collect, update, secure, exchange, and share knowledge helps make reusable the best problem solving experience, helps accelerate delivery of value to the marketplace, and emphasize the importance of learning. What then does it mean to create a knowledge management culture? It is about making knowledge exchange and/or sharing the norm. To create a knowledge management culture, encourages people to work together more effectively, to collaborate and to share, ultimately to make organizational knowledge more productive.

Whether the objectives of a knowledge management strategy are to improve operational efficiency, enhance organizational learning, intensify innovation, or speed up response to the market, a culture change strategy designed to transform behaviors and practices is a

critical part of almost any knowledge initiative. On the other hand, corporate culture is based on traditions that have developed since the company's founding, and have grown in succession over the years. Hence some maintain that making changes, if limited to adopting some knowledge management (or any other kind of) policies, may prove futile. Attempts to change corporate culture by external force or excessive pressure may push a company into a period of disorder.

2.1.6 Motivation

Since this thesis is focused on the motivational aspect of knowledge sharing, in addition to introducing knowledge management concepts, the main theories about motivation have to be mentioned. This chapter defines motivation and explains briefly the principal motivational theories. While this chapter is a general introduction, the next chapters will examine more deeply the application of these theories to knowledge sharing.

2.1.6.1 Definition

"Motivation is forces acting either on or within a person to initiate behavior." (Encyclopedia Britannica Online 2008) According to Geen (1994), motivation refers to the "initiation, direction, intensity and persistence of human behavior". Pinder (1998, p. 11.) defines work-motivation as "a set of energetic forces that originate both within as well as beyond an individual's being, to initiate work-related behavior and determine its form, direction, intensity and duration".

2.1.6.2 Main theories

This chapter introduces briefly the main motivational theories which are the foundations for the motivational aspects of knowledge sharing.

One of the most basic theories concerning motivation is the Drive Reduction Theory. According to Hull (1943), motivation starts with a drive, which can be as simple as a biological need such as hunger. The strength of the motivation depends on the intensity of the drive: when this drive strengthens, one gains motivation, once the desire is fulfilled, the strength of the drive is reduced and we become calm. While this theory is very powerful explaining basic drives, it cannot cover more complex situations where people choose not to reduce, or even increase, their level of drive or arousal.

The Arousal Theory states that in order to feel good we are driven to maintain a certain level of arousal, which can be of emotional, intellectual or physical source. While the previously discussed Drive Reduction Theory claims that tension should be reduced, the Arousal Theory is based on the idea that people with too little arousal become bored and people with too much stimulation get anxious and will search for sensation or thrill. (Hancock 1987)

In contrast to the Arousal Theory, the Psychoanalytic Theory explains motivation based on the unconscious. It has been developed by Freud (1955). It is based on the duality of Eros, the god of Love and Beauty and Thanatos, the daemon personification of Death in the Greek mythology. According to Freud, in all situations in our lives we act either to survive (Eros) or prevent our destruction (Thanatos) and it is our unconscious part of our mind which is guiding us in this matter.

The Humanistic Theory has provided the most applied approach to motivation in the business world. The cornerstone of this theory is the self, which is free to choose, has some determination to develop and is less dependent on the environment in comparison to the previously discussed theories. Maslow (1968) was one of the founders and certainly the most famous promoter of the Humanistic Theory. He points out the existence of a large variety of individual needs, which all can be organized into five categories: basic physiological needs, need for security and safety, need for love and belonging, need for recognition, including status and power, and need for self-actualization. The principle of this “Hierarchy of Needs” is that the needs can only be achieved in order starting from the lowest to the highest of the hierarchy. According to Maslow nobody can reach the highest level (self-realization) completely. What it means for organizations is that they should

analyze the levels of their employees in terms of Maslow's "Hierarchy of Needs" in order to be able to motivate them efficiently.

The Cognitive Theory adds a new dimension to the Humanistic Theory by suggesting that human beings actively process and interpret information and their actions are based on conscious choices based on past experience, available information and their judgment of the risks and probabilities. For example, according to one branch of the Cognitive Theory, the Expectancy Theory (Vroom 1964), motivation is the product of perceived chance of reaching success, the level of connection between reaching success and getting a reward, and the value of the reward.

2.2 Literature focused on motivational aspects of knowledge sharing

Motivational aspects of knowledge sharing cover questions such as "Why would anyone share her/his knowledge?", "What determines if knowledge is shared or not?", "How can people be motivated to share knowledge?". This chapter explains that there is a social dilemma behind these questions; therefore knowledge sharing does not take place automatically without clear motivation. We will cover studies explaining the main barriers to knowledge sharing, theories promoting intrinsic and extrinsic motivation and studies which realized the importance of social and organizational aspects beyond the personal ones. Besides these personal and organizational aspects, the necessary conditions to knowledge sharing will be discussed as well. The chapter will close with theories which aim at combining all factors and will conclude that there is no framework which covers it all in a concise and comprehensive way.

According to Connolly and Thorn (1990), knowledge sharing is a particular instance of a paradigmatic social situation known as a social dilemma. Social dilemmas can be described as paradoxes in which individual rationality, simply trying to maximize individual payoff, leads to collective irrationality (Kollock 1998). A popular textbook example of a social dilemma is the tragedy of the commons (Hardin 1968), a situation in which a group of herders has open access to a shared property where they can let their cows graze. From the point of view of each individual herder, there is a clear benefit in

letting as many cows as possible onto the commons, but if everyone did that, the commons would be damaged to the point where no one would be able to benefit from it. This is called a dilemma because individual optimizing behavior can result in collective suboptimum. Indeed, individuals quite often tend to think that hoarding knowledge and not sharing it increases job security and career development, but for sure it is counterproductive for their organization. (Michailova & Husted 2001)

Another interesting dilemma is related to the fact that knowledge is a quasi-public good, as seen earlier in this dissertation. Organizational knowledge can be seen as a public good (e.g., Wasko and Faraj 2000, Connolly and Thorn 1990), because an individual can make use of the knowledge available in the organization for her/his own benefit without decreasing this available knowledge (actually, as we have seen, it is even increasing). This brings the well-known free rider effect. The failure to contribute is a recurring problem in both corporate knowledge management and consumer-to-consumer systems. The file sharing network called Gnutella gives a perfect example. It is the most popular file sharing network on the Internet with a market share of more than 40% and yet Adar and Huberman (2000) found that 70% of Gnuttela users do not add any files to the system and that nearly 50% of all search queries are returned by just 1% of those that do contribute. Saroiu & Gummadi & Gribble (2002) report that 26% of Gnuttela users share no data and estimate a figure for Napster (another file sharing network which used to be the most popular before it was turned into a paid service) of 20-40%. These dilemmas are clear examples that the motivations in knowledge sharing are therefore of critical importance to the whole topic of knowledge sharing or even knowledge management. Without clear motivation, any knowledge management initiative will suffer. (McCarthy & Sasse & Riegelsberger 2002)

Just like researches about the above mentioned dilemmas, there have been numerous studies (e.g., Davenport & Prusak 2001, Bechina & Bommen 2006) looking at the obstacles to knowledge sharing. The list of barriers to knowledge sharing includes unfavorable organizational culture, undeveloped communication within the enterprise, different technological background, weak commitment of managers to the knowledge sharing process, lack of motivation from superiors for knowledge sharing, lack of financial incentives promoting research for new knowledge and transfer of it, protection of one's own position/specialization, intolerance for mistakes or need for help, lack of sentiment that the knowledge that one possesses may be useful for other people working in the

organization, lack of time, and lack of trust, etc. Similarly, Hendriks (1999) found four major obstacles to knowledge sharing: lack of time, geographical distance, lack of abilities, and cognitive distance. These points are all valid, but this dissertation is interested in the motivation of knowledge sharing, not the obstacles. There is an important difference, because removing obstacles may not increase knowledge sharing if the motivation is not clear to participants. Therefore, in the rest of the discussion, knowledge sharing theories are analyzed which have a "positive" approach, i.e., they are focus on the question "why" and not on "why not".

Maslow's (1968) theory has been discussed in the previous chapter. It can be directly applied to knowledge sharing. The theory implies that hard incentives, such as financial benefits, can serve as motivators only up to a certain point. Soft incentives are the top motivators. Similar to Maslow, Hall (2001a,b) distinguishes between hard and soft rewards. Hard rewards are tangible economic rewards and soft rewards can be enhanced reputation and personal satisfaction.

Numerous companies have tried one or the other or even combined both. A notable example is the ShareNet initiative inside Siemens ICN. It is a global collaboration and knowledge-sharing network for the sales force. Contributions such as documents to ShareNet are rewarded with ShareNet "Shares". Through peer ratings the quality and (re)usability of the contributions are assessed. Siemens not only rewards the contributors, but also the re-users of ShareNet content. The "Shares" can be exchanged for real (Siemens) products. Besides that, top ShareNet contributors are rewarded with an invitation to the ShareNet global knowledge-sharing conference. This system turned out to be expensive, especially following the burst of the so-called "3G bubble" in the telecom market, so it was replaced by a reward system where excellent participants receive an expert or master status. This new system proved less popular than the monetary system: there appeared to be a considerable decrease in traceable knowledge sharing activities. (Kugel & Schostek, 2004). Andriessen (2006) lists some further examples where companies tried to encourage knowledge exchange by an incentive system: Hewlett-Packard Consulting uses a mix of reputation and monetary benefits as incentives. It gives so-called "Knowledge Masters Awards" to those employees who contribute significantly and measurably to the success of the company and award winners receive cash or a paid trip. Scott Paper gives financial incentives, e.g., increased pay, bonuses, and stock options.

IBM gives monetary incentives: a bonus is split between the one sharing the knowledge and the one reusing the knowledge. Chevron and World Bank make the knowledge sharing effort of the employees part of their regular annual evaluation. (Liebowitz & Chen 2003) This way not only the salary, but the whole career is affected. Schlumberger uses reputation as the main incentive. In the corporate portal, the names of the distributors of the information are highlighted.

Ryan and Deci (2000) conducted many empirical studies concerning the difference between intrinsic and extrinsic motivation; they argue that intrinsic motivation is the strongest type of motivation. They showed that in many cases people who are intrinsically motivated persist longer, solve more challenges, and reach more success than those who are extrinsically motivated. Furthermore, they state that extrinsic motivation is dysfunctional, people tend to focus more on the reward than the expected behavior. Hall and Sapsed (2005) even pointed out that extrinsic motivation may function well for codified knowledge, but fails in case of sharing tacit knowledge. This research will, therefore, accept the recommendation from Lam and Lambermont-Ford (2008) who argue that soft and hard motivators need to be combined and seen as a continuum (and not as a hierarchy as suggested by Maslow).

When combining intrinsic and extrinsic motivators, it is crucial that they enforce each other. This phenomenon is called "crowding-in" by Frey and Jegen (2001) and "synergistic" by Amabile (1997). For example, the extrinsic motivation of career progression can be in line with the knowledge workers' intrinsic motivation of reaching certain quality goals. On the other hand, if intrinsic and extrinsic motivations are in conflict, for example, if the remuneration depends on the number of transactions and self-determined initiatives are not appreciated enough, the extrinsic motivators can weaken the intrinsic motivators and result in "crowding-out" or "non-synergistic" effect. (Frey & Jegen 2001, Kreps 1997, Amabile 1997) The alignment of intrinsic and extrinsic motivation is, therefore, one of the key tasks in knowledge management initiatives.

Kelley and Thibaut (1978) went beyond the above individualistic approaches and introduced social and organizational aspects. They focused on motivation in relationships and they developed the Social Exchange Theory, which contains the following principles: people exchange resources; people compare costs and benefits; and people predict the

expected behavior of other people. While this Social Exchange Theory was created for exchange of all kinds of things, Constant, Kiesler and Sproull (1994) made it specific to knowledge exchange. Their theory, called Information Sharing Theory, argues that information sharing is effected not only by rational self-interest as mentioned above, but the social and organizational context as well.

This is in line with Kelman's (1958) Theory of Social Influence, which describes knowledge sharing in terms of three social influence processes: 1) People are affected by external positive (reward) or negative (punishment) incentives, they are socially influenced to comply. For example, if knowledge sharing is explicitly rewarded in the annual evaluation of employees, then it will stimulate knowledge sharing. Or from the point of view of a negative incentive, if employees have to share information lest they risk their job, then they will share knowledge. 2) Knowledge sharing can take place based on identification with others: i.e., people may share knowledge just to maintain their relationships with others. 3) Internalization can lead to knowledge sharing when people are motivated to share knowledge simply because they believe in knowledge sharing based on their general value system. Bock and Kim (2003) conducted a survey of almost 500 employees of four large organizations and they also discovered a mix of individual and organizational aspects. They were looking for the reasons for knowledge sharing and they found that "anticipated reciprocal relationships" and "perceived personal contribution to the organization" were the major determinants of the individual's attitudes towards knowledge sharing. "Anticipated reciprocal relationships" are emphasized by Hagström (1965) too, who formulates knowledge sharing as gift giving. Gift givers do not expect a specific gift in return, but generalized reciprocity.

Besides the literature focusing on extrinsic incentives, intrinsic motivation and mixed approaches, many studies analyze the conditions necessary for knowledge sharing. Ladd & Heminger (2003) state that there are four factors which appear to influence knowledge transfer.

- Diane & Zaheer & Anderson (2000) show that an organization with more relational channels for transferring knowledge may be in a better position to enable knowledge sharing, because its human-to-human relational channels allow exchange of tacit knowledge.

- Similarity of individuals attempting the transfer will influence the transfer (Almeida & Kogut 1999). Individuals who are similar (in terms of education level, background, experiences) will understand each other better and sharing knowledge will be easier. Darr & Kurtzberg (2000) showed that partner similarity is a strong predictor of knowledge transfer between organizations.
- The factor of organizational self-knowledge is described by Diane & Zaheer & Anderson (2000). Organizational self-knowledge means that members of the organization are aware of their own knowledge and based on this information they can decide who has complementary knowledge and can start sharing.
- Divergence of interests (Alchian & Demsetz 1972, Jensen & Meckling 1976, Donaldson 1990) influences knowledge sharing, because if the interest of an individual is not in synch with the interest of her/his organization, then the individual may be less interested in sharing knowledge for the benefit of the organization.

Xenikou and Furnham (1996) identified a number of factors related to organizational culture. According to Ladd & Heminger (2003) four of these factors can be seen as a type of organizational culture:

- Openness to change/innovation. Organizations which are open to change and innovation can be described by other concepts like "humanistic orientation, affiliation, achievement, self-actualization, task support, task innovation, and hands-on management". (Ladd & Heminger 2003)
- Task-oriented organizational culture types group the following concepts together: "being the best, innovation, attention to detail, quality orientation, profit orientation, and shared philosophy". (Ladd & Heminger 2003)
- Bureaucratic organizational culture features the following properties: "approval, conventionality, dependence, avoidance, lack of personal freedom, and centralized decision-making". (Ladd & Heminger 2003)
- Competition/Confrontation organizational culture can be associated with the following concepts: "oppositional orientation, power, competition, and perfectionism". (Ladd & Heminger 2003)

Ladd & Heminger (2003) demonstrate the correlation among these culture types and the above-mentioned factors in knowledge transfer. “Openness to change/innovation appears to relate positively to relational channels and organizational self-knowledge, and negatively to divergence of interests. Task-oriented organizational growth appears to relate positively to relational channels and organizational self-knowledge, and negatively to divergence of interest. Bureaucratic does not show a significant relationship to any of the four factors that may influence knowledge transfer. Finally, competition/confrontation demonstrates a negative relationship to relational channels, and possibly organizational self-knowledge, and a positive relationship to divergence of interest.” (Ladd & Heminger 2003, p. 7.)

Many of the motivational theories only describe factors which affect knowledge sharing, but do not provide a complete explanation about why knowledge sharing occurs. An example could be that from research (e.g., Huysman & Wit 2002) it is known that people are much more willing to talk about their ideas and solutions to others than to put them in a database. This is an important point, but not a complete explanation about knowledge sharing motivations.

Bock et al. (2005) tried to summarize all factors and develop a unified theory. Eventually their research resulted in a rather long list of factors: anticipated extrinsic rewards, anticipated reciprocal relationships, sense of self-worth, affiliation, innovativeness, fairness, attitude toward knowledge sharing, subjective norm, organizational climate, and intention to share knowledge. Andriessen (2006) tried to combine all these different theories and approaches and designed the rather complex Multifactor Interaction Knowledge Sharing (MIKS) model. (Figure 8)

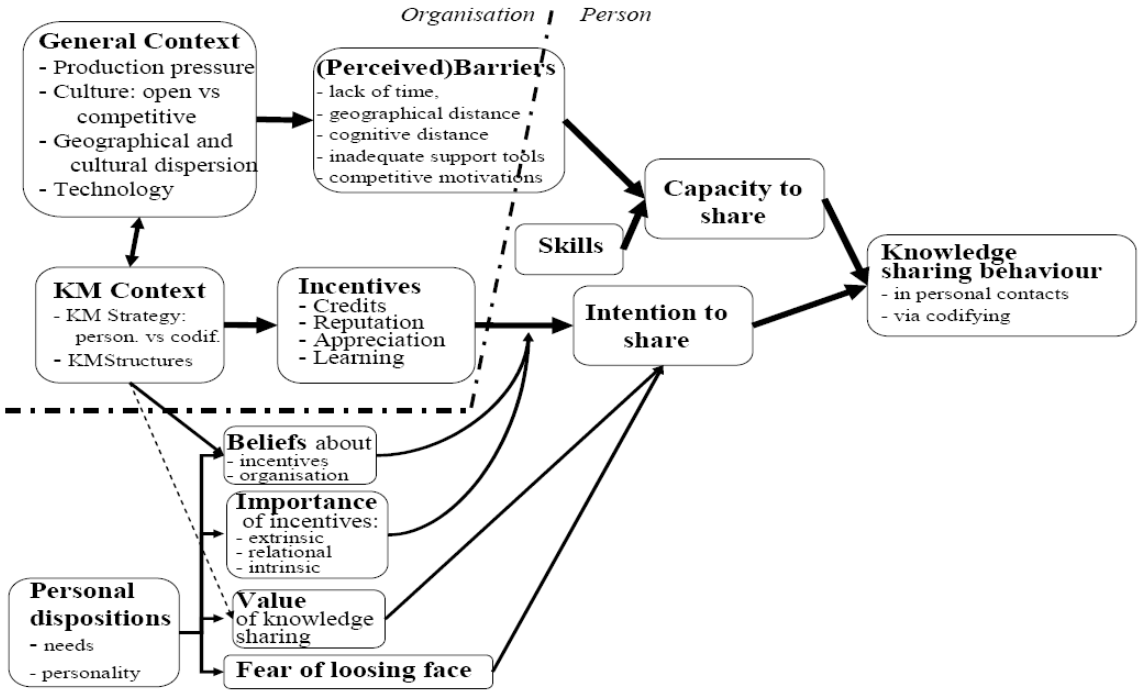


Figure 8: Multifactor Interaction Knowledge Sharing (MIKS) model

(Source: Andriessen 2006, p. 27.)

In the MIKS model incentives can be positive and negative and can be categorized based on human needs. Table 4 summarizes these incentives.

It is easy to see that Andriessen's MIKS model contains a lot of specifics and therefore it is rather complex. It has not yet been tested in practice, but in any case, managers probably would not find it easy to act upon such a big model. A good theory has to be comprehensive, but at the same time applicable. Fiske's Relational Models Theory has both strengths. Furthermore, most models list a great number of factors (organizational structure, ease of use of the KM systems, career advancement, etc.) which impact knowledge sharing, but the real question is the motivation for knowledge sharing. It has been shown (Nahapiet & Ghoshal 1998, Tsai & Ghoshal 1998) that the level of trust correlates with the level of knowledge sharing, but it is obvious that trust is not a motivation, but a prerequisite. Fiske's theory, described in the next chapter, does not deal with all related factors, but with motivations explicitly.

Table 4: Incentives in the MIKS model. (Source: Andriessen 2006, p. 29.)

Incentives → ***Need for ↓***	***Positive Outcomes / Incentives*:** *People share when the following outcomes are valuable to them and when they expect that by sharing knowledge they will receive those outcomes*	***Negative Outcomes / Incentives*:** *People will NOT share when they dislike the following outcomes and when they expect that by sharing they will receive these outcomes*
Existence and Security	Positive annual appraisal and career opportunity / Job security / Career advancement / hard rewards	Bad performance (rating) because sharing takes time Lose job because knowledge becomes codified and used by others.
Relations	Become and remain member of a particular group / community / Accepted by others / Group commitment	Get criticism because close colleagues do not want the person to share with others outside the group
Status	Acknowledgement of expertise / reputation	Fear of losing face, because information may be bad or not relevant, or already well known by others.
Power	Gain power by showing expertise	Lose power because others use information given by the person
Achievement and Self- actualization	learning and personal growth / fun and satisfaction	

2.3 Fiske's theory

Fiske derived his Relational Models Theory (RMT) inductively from his West-African fieldwork, and combined it with findings from around the world. Based on this very careful research series, Fiske (1991, 1992) argues that human beings are fundamentally social, and most social relations can be described by four models:

- Communal Sharing (CS)
- Authority Ranking (AR)
- Equality Matching (EM)
- Market Pricing (MP)

Fiske (2004) states that "Relational models theory is simple: People relate to each other in just four ways. Interaction can be structured with respect to (1) what people have in common, (2) ordered differences, (3) additive imbalances, or (4) ratios. When people focus on what they have in common, they are using a model we call Communal Sharing. When people construct some aspect of an interaction in terms of ordered differences, the model is Authority Ranking. When people attend to additive imbalances, they are framing the interactions in terms of the Equality Matching model. When they coordinate their actions according to proportions or rates, the model is Market Pricing." The theory may be simple, but Fiske's book, Structures of Social Life: The Four Elementary Forms of Human Relations (Fiske 1991), a 480-page expansion of his dissertation as a graduate student at the University of Chicago, has become a classic of social science literature and triggered some 40 studies by 15 researchers (Sullivan 2005) to apply, discuss and validate Fiske's relational models.

"If you understand these four systems, you understand the basic human motives, emotions, judgments, and ideas that govern social relations. They form the basis of every aspect of human social behavior – from the exchange of goods and services to the organization of work and the social meaning of objects, land and time. They organize ideas about social justice, moral judgment, political ideology, religious observance and social conflict." – Fiske said. (Sullivan 2005)

According to Fiske's theory there are only four models. On the other hand, there are many factors which influence the relationships. To understand how people relate to each other, we cannot just look at social relationships in isolation, but "we need to link social psychology to ethnography, ethnology, cognitive science, neuroscience, clinical psychology, evolutionary psychology, developmental psychology, economics and management science, and social theory." (Fiske 2006)

Communal Sharing relationships are formed among people who are considered and who consider themselves equal (in one or more aspects). The participants in this relationship feel togetherness; they are bounded; they have something in common (interest, origin, blood, etc.), and refer to themselves as "we". Members of a team or ethnic group or people in a romantic relationship exemplify Communal Sharing. CS is the core framework for parks or roads, love and close friendships and ethnicity. Members can take as much as they

need and contribute as much as they can and nobody is measuring the take or the give. CS is an equivalence relation, hence reflexive, symmetric, and transitive. Reflexive means that the relation can be understood by the participants in the relation themselves. E.g., people are kind and caring with themselves. CS is symmetric, because if one participant is equal to the other one, then the other one is also equal to the first one. Transitive means that if participant A has CS relation with B and B with C, then A also has with C.

"People simply take what they need and contribute what they can, without anyone attending to how much each person contributes or receives. A person does not need to give something in order to get something in return – simple membership in the group is sufficient to entitle one to the use of whatever resources the group controls, and long-run imbalance is not a violation of the relationship." (Fiske 1991) Participants do not need to keep track of who gives what to whom, there is no bookkeeping of gives and takes.

Authority Ranking is based on hierarchical ranking and asymmetry of the participants in the relationship. In any situation, in the case of any two people, there is a clear superior-subordinate relation. AR is evident in military command, in corporate or government chains of command, in social status systems, in relations of seniority, and in relationships with supreme beings. AR can be described by guidelines such as "Do as you are commanded by your superiors" or "Respect and defer to your betters." In an AR relationship the most important question is the position: being above or below the other people. AR is a linear ranking; therefore reflexive, transitive, and asymmetric. AR is linear, because it is always clear who is the superior and who is the subordinate. It is reflexive because the relation has to be understood by the members of the relation, it is transitive, because if participant A is superior to B and B is superior to C, then A is superior to C. It is obviously asymmetric, because if participant A is superior to B, then B is not superior to A.

"In distributions, high-ranking people may preempt rare or valuable items, so that inferior people get none at all. When people transfer things from person to person in an AR mode, higher-ranking people get more and better things, and get them sooner, than their subordinates. In bilateral transactions, subjects may have to pay goods in tribute to rulers, or authorities may simply appropriate what they want."

Equality Matching is keeping the contributions to a relationship in balance. Each participant tries to contribute and benefit to the same extent as all others. EM can be observed in turn-taking, rules of games and team sports, voting, dinner invitations, car pooling or eye-for-eye retributions. Typical narrative would be "You did two favors for me, I did only one for you, so I still owe you one." The core of EM is keeping track of the balances and each participant knows or has to find a way to provide value in the size that is expected from her/him. This egalitarian relationship is commutative and associative. Commutative, because it does not matter in what order the different values were provided, as long as the right amount of value was provided in total. Associative means that it is not relevant how the various goods or services are grouped together.

Market Pricing uses ratios and rates. The value of contributions and benefits is expressed qualitatively, mostly in terms of money. MP is a relationship based on proportionality; participants interact with reference to some system of ratio values. The most salient examples are prices, wages, rents, and interest rates, basically any example of ratios of exchange, not intrinsic values as established in chapter 2.1.1.5 about the value of knowledge. People using this model make decisions according to rational calculations of cost and benefit or supply and demand. The MP relationships are exchanges according to the price (or utility) ratios of the items. Multiplication is associative and commutative; addition and multiplication are distributive. These properties are well-known properties in mathematics and MP is based on numeric expressions of values.

Fiske mentions two reasons why these four models are widely used. He finds both reasons plausible, and is not sure to what extent one or the other is the stronger argument:

- "People are fundamentally sociable – they generally organize their life in terms of their relations with other people."
- "It may be that people use these fundamental models to organize social relationships just because of these felicitous properties [Author: the mathematical-logical properties mentioned above] that permit flexible application while maintaining informational specificity."

According to Fiske (1992), "the theory predicts that the same four structures order all kinds of social relations, whatever the medium of the interaction and regardless of its content, context, or culture."

Fiske and Tetlock (1997) showed that the four models even correspond to political ideologies. Fascism and feudalism would be roughly depicted by AR; the green movements or Marxism apply CS; MP-based thinking is close to libertarianism, while EM produces a certain flavor of populist liberalism. Ideologies may mix the models; nevertheless, they tend to emphasize only one model as fundamental in their value-structure. The models can also describe decision making mechanisms such as AR, predominant in medieval monarchies; the Quaker community would mostly use CS, etc. (Fiske & Tetlock 1997) Fiske states that the four models are so fundamental, that indeed "If you understand these four systems, you understand the basic human motives, emotions, judgments and ideas that govern social relations." (Sullivan 2005)

2.3.1 Knowledge sharing patterns

Fiske said that "The point is that an incredible diversity of complex structures can be built out of a few elementary forms." (Sullivan 2005, p. 2.) Indeed, this research has shown that the four models can be mixed and even in one interaction multiple models can be present. This is what the author calls patterns and this can be considered an extension of Fiske's theory.

The Merriam-Webster dictionary defines pattern as "a reliable sample of traits, acts, tendencies, or other observable characteristics of a person, group, or institution." Introducing the concept of patterns into knowledge sharing has immediate benefits, because some basic techniques, such as pattern matching and pattern recognition, used in various sciences which deal with patterns can be applied. Pattern matching is the act of checking for the presence of a pattern, whereas pattern recognition consists of techniques for detecting and identifying patterns in the raw data. A pattern recognition system works in three steps: 1) a sensor gathers observations 2) a device or software extracts features from the observations 3) the features are classified. In knowledge management the steps are identical: 1) first sensing has to occur 2) noticing the patterns 3) then the feature extraction means identifying knowledge sharing behaviors and classification involves deciding which behavior is related to which relational model.

An example could be when two army officers share knowledge. To some extent they may be ordered to discuss some topics (AR), but one may tell something because the other already told something useful for her/him in the past (EM) or they may even see themselves in the same situation and consider themselves members of the same community group (CS). The motivations, i.e., the four models may appear as a pattern. The following chapters show numerous examples of such relational model patterns.

2.3.2 Models of social relations with their implications for knowledge sharing

Even though Fiske took various initiatives to show the general applicability of his theory, he never focused on the knowledge sharing aspect of human interactions. On the other hand, Fiske did write: "Analysis of these meaningful operations and relations suggests that these four structures operate when people transfer things (bilateral exchange, contribution, and distribution)" (Fiske, 1992, p. 690.) This is an indication that the theory should be applicable to knowledge sharing as well, but still, it was first Boer, van Baalen and Kumar who applied Fiske's theory to knowledge sharing. Table 5 summarizes how the four models are present in knowledge sharing in terms of four aspects: object of exchange, timing of reciprocity, breakdown, and narrative. The exact same four aspects will be used in the survey discussed in the following chapters.

Table 5: Relational models in knowledge sharing. (Source: Boer & van Baalen & Kumar 2004)

	Communal Sharing	Authority Ranking	Equality Matching	Market Pricing
Object of exchange for sharing knowledge	None or nothing specified	Respect, loyalty, authority or pastoral care, loyalty	Similar knowledge	Specified value
Timing of reciprocity	No or unspecified	Non-specific	Implicitly specified in (short) future	Direct or specified in future
Breakdown	Knowledge sharing with outsiders	Evaporation of power base	Violation of equality	Exploiting the other
Narrative	"We just all try to do what we can, and that's different for everybody."	"It is not a matter of free will, I have to share my knowledge."	"Now it is my turn to coach the newcomer." "I owe you one."	"As long as they are paying me enough for my expertise, I will share my knowledge."

Appendix 2 contains further details of the summary made by Boer & van Baalen & Kumar about how the four models of the Relational Models Theory can be applied to knowledge sharing. (2004, p. 22.)

The latest research in the field of applying the Relational Models Theory to knowledge sharing has been done by Boer & Berends (2003) who examined an industrial research group. The last sentence of their article refers to very comparable research performed by Bij et al. (2003): "They may have gotten a different result when, for example, consultancy firms were studied." As mentioned earlier, it has not yet been proved that the theory can be applied to a consulting firm or an online community and this is what this PhD project aims to achieve.

3 CONTENT, METHOD AND GOAL OF THE RESEARCH

3.1 Goal of the research

As mentioned earlier, according to Philips (2002, p. 9), ”knowledge is the capacity to act in a context.” Following this principle, the research went beyond proving or disapproving hypotheses, as it is often done in PhD projects, it aimed at even creating “actionable intelligence”, i.e., guidelines for knowledge managers to encourage/improve knowledge sharing. Therefore, the goal of this research is triple and there are three hypotheses assigned to it:

G1: Prove the validity of Fiske’s theory for a consulting firm and an online community

H1: Fiske’s relational theory describes the knowledge sharing mechanisms in a consulting firm (called Intenzz SAP Consulting Group).

H2: Fiske’s relational theory describes the knowledge sharing mechanisms in an online community (called SAP Community Network).

G2: Investigate the knowledge sharing practices within Intenzz SAP Consulting Group

H3: Since Intenzz SAP Consulting Group is a knowledge-intensive consulting company, the Community Sharing model dominates in the internal knowledge sharing practices. (More than 50% of the motivation in the internal processes follow the Communal Sharing model.)

G3: Create practical guidelines for managing the knowledge sharing patterns within Intenzz SAP Consulting Group

Note that G1 does not try to generalize to the complete set of consulting firms and online communities, but it is limited to two elements. The value of reaching this goal is that it

proves the applicability of Fiske's theory in two new domains, which have never been researched before. Considering that Fiske developed his Relational Models Theory in a West-African ethnographic fieldwork, it is far from obvious that it can be applied to knowledge sharing in a Dutch SAP consulting firm or in a global online community. Reaching G1 means that Fiske's theory "works" in areas not foreseen before. Whether it is applicable to all elements of the two sets (consulting firms and online communities) is out of scope of this research and would be a logical next step of another follow-up study. G2 and G3 are goals only for Intenzz, because the author was in a position to suggest improvements in the knowledge management practices of this organization. This was not the case for an independent community; therefore there is no added value in focusing on G2 and G3 for the SAP Community Network. The results produced to reach G2 and G3 are not generalizable without further research, but demonstrate the practical value of Fiske's theory. (A generalizable, representative sample based research would not have been possible for the author to conduct due to his position.) Furthermore, the exploratory research conducted to realize G2 and G3 gives the insight, lays the foundations, formulates the right questions and develops the tentative propositions which can be tested in another subsequent explanatory research.

3.2 Content of the research

The content of the research is the analysis of two organizations: Intenzz SAP Consulting Group and SAP Community Network. Both are knowledge-intensive organizations; therefore knowledge processes are of very high importance. All characteristics of knowledge-intensive organizations – non-standardization, creativity, high dependence on individuals, complex problem-solving (Sveiby 1992) – fit completely for both Intenzz and the SAP Community Network. Both operate in the SAP business; therefore, in order to better understand these two companies and their business processes, the following paragraph gives a short introduction to the SAP market.

"SAP is the world's leading provider of business software, offering applications and services that enable companies of all sizes across more than 25 industries to become best-run businesses." (SAP 2010) SAP has more than 41,200 customers in over 120 countries. The 25 industries contain high tech, retail, financial services, healthcare, the public sector,

etc. “SAP offers a portfolio of business software, technology, and related services and support to meet the long-term requirements and mission-critical needs of their customers.” (SAP 2010)

The flagship product of SAP is the Business Suite which is running on the NetWeaver platform. The Business Suite includes Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, etc. NetWeaver includes Process Integration (middleware), Portal, Identity Management, Business Intelligence, etc. “SAP NetWeaver is a web-based, open integration and application platform that serves as the foundation for enterprise service-oriented architecture (enterprise SOA) and allows the integration and alignment of people, information, and business processes across business and technology boundaries. It utilizes open standards such as HTTP, XML, and Web services, to enable integration with information and applications from almost any source or technology. SAP NetWeaver is the foundation of SAP Business Suite and SAP Business ByDesign, and also powers partner solutions and customer custom-built applications. It ensures openness and interoperability among others with Microsoft .NET, Java Platform Enterprise Edition (Java EE 5) environments and IBM WebSphere.” (SAP 2010)

3.2.1 Introduction to Intenzz SAP Consulting Group

Intenzz SAP Consulting Group (from now on, referred to as Intenzz) is a SAP consulting company in the Netherlands focusing on SAP NetWeaver technology. The group was founded in 2006; it consists of 3 business units: NetWeaver Services, Business Intelligence Services, and Business Process Services. Intenzz currently (as of June, 2008) employs 35 senior consultants.

While there are approximately 4,500 SAP consultants in the Netherlands, only a small portion of them has specialized NetWeaver knowledge. This makes Intenzz, albeit with only 35 consultants, an important niche player in the market.

Consulting in SAP NetWeaver requires both business knowledge and very good IT, especially up-to-date SAP knowledge. This makes knowledge the most important asset of Intenzz and its main product (see chapter 2.1.1.4 about the nature of knowledge) and

knowledge management a key process and strength in such a consulting firm. (Krogh & Ichijo & Nonaka 2000, Ortwein & Spallek 1998). Intenzz has to effectively and efficiently organize and manage knowledge sharing in order to harness knowledge and learn faster than the competition. (See chapter 2.1.1.6 about the role of knowledge in the economy.) The Intenzz culture, therefore, can be characterized by a pragmatic approach, high knowledge level, enthusiasm and intensive collaboration with customers and employees.

Intenzz offers a way of working that differs from the competition (based on the study done by Grolik S. et al. (2003) about KM in consulting firms):

- Consultants get continuous and permanent education. Investment in consultants and knowledge sharing with colleagues and customers are core values.
- Consultants are expected to show commitment and entrepreneurship. As the company is privately held, ownership creates continuity.
- Consultants can work in teams or individually on projects.
- Remuneration is flexible and based on performance.
- The teams are self-contained; there is little top-down control and central overhead.
- Consultants have a say in business decisions.

Sveiby (1992) summarizes his findings regarding success factors for knowledge-intensive organizations:

- Focus. The organization has to have a very clearly defined and expressed, not too broad, focus. For Intenzz this is SAP NetWeaver consulting in the areas of business intelligence, enterprise portals, and process integration. (See chapter 2.1.1.4 about knowledge as a product.)
- Organic Growth. Organic growth is important for the balanced development of the organizational culture. Intenzz hires its own employees in a very selective process.
- Quality Control. The benefit of being knowledgeable is the ability to deliver quality to customers. Intenzz is well-known for its high quality standards ensured by its senior consultants.
- Developing Core Know-How. An organization can stay ahead of its competitors only by constant reinvestment in its own knowledge creation. Intenzz invests extra effort in knowledge sharing, communities of practice, and other knowledge processes.

- Retaining Key People – Preserving Know-How. As knowledge is in the mind of the employees, keeping them is crucial. Employee fluctuation at Intenzz is minimal.
- Small is Beautiful. Creative people tend to like small organizations more. Intenzz consciously decided to stay small to attract such highly talented people.
- Economy of Scope. This rule balances the "Small is Beautiful" rule, because too small an organization is not able to serve customers in many larger projects. Intenzz has realized this, so it aims for about 20 professionals per focus area.
- Strong Culture – Little Need for Formal Center. Highly knowledgeable and creative employees do not need and do not like central formal power. Intenzz has an absolutely minimal central power: the owners. All other employees function as consultants.
- Leaders Come from the Profession. Such leaders understand the business better and are able to attract real experts. At Intenzz, the two owners have 10 and 15 years of experience in the Dutch SAP consulting market.

Based on these success factors defined by Sveiby (1992), Intenzz represents an ideal example for a knowledge-intensive consulting firm.

3.2.2 Introduction to the SAP Community Network

The SAP Community Network is a web-based community of around 1 million users. It is accessible at http://www.sap.com with a user ID and password. SAP has merged various online communities into this one community; therefore there is some uncertainty regarding its name. In some places it is called SAP Community Network, but it is also known as SAP Developers Network (SDN, sdn.sap.com). Actually, SAP Community Network is the latest name; hence this name will be used hereafter, but some quotes may cite SDN. From now on SDN and SAP Community Network will be used interchangeably. The Business Process Expert Community (BPX, bpx.sap.com) was launched in the Fall of 2006. It targets business process managers instead of SDN's mostly technical audience. Even though the usage of the names is not consistent, SDN and BPX fall under the SAP Community Network.

As the Community Brief states: “SAP Community is an award-winning Web site that provides customer-focused business information for its members. During its four years of existence, the success of SAP Community has been reflected in the continuous growth of membership and online activity in a business environment driven by the need to streamline operations and adhere to strict ROI strategies. The peer-to-peer networking aspect of SAP Community adds knowledge and expertise to the traditional content, raising it to a new level of customer self-service.

Members visit SAP Community Network to learn and tap into the collective expertise of SAP and other professionals worldwide. While individual members share experience, knowledge, and best practices one-on-one, the entire community benefits collectively from insights into members’ top-of-mind business issues. (See chapter 2.1.1.4 about knowledge as a quasi-public good.) SAP Community Network members learn about real-life experiences in companies just like theirs. Not only do they benefit from the successes of others and learn how to avoid common pitfalls, they also discover new, must-have strategies that emerge every day in today’s fast-moving business world.” (SAP 2004) “The SAP Developer Network is designed to facilitate the transfer of knowledge and information among all of the various technical communities who are working with SAP NetWeaver and SAP xApps. Customers, partners and newcomers to the SAP ecosystem will find detailed information on evaluating, implementing, building and using these technologies, all in one place.” (Word 2003, p. 3.)

The major areas are as follows (Finnern & Elder 2005):

- Upcoming Events (All current on- and off-line SAP events, like congresses, conferences, etc.)
- Available Events (All past events)
- Executive Blogs (Blogs from the members of the Board)
- Discussion Forums (Online peer-to-peer conversations organized in roughly 20 categories.)
- Member Services:
    - Member Rewards
    - Members’ Lounge (A place where members can have a casual conversation or discussion.)

Other features:

- Simple and advanced search
- Downloads of numerous SAP-related documents
- Personal profile
- Links to other SAP resources

Figure 9 shows a screenshot of the home page of the SAP Community Network.

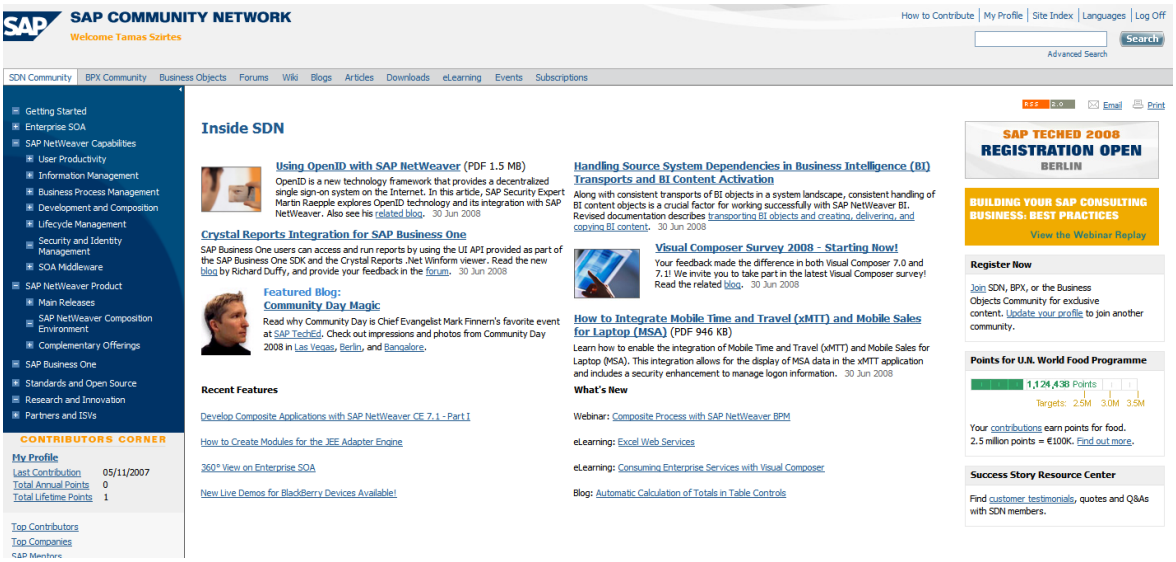


Figure 9: SAP Community Network home page (Source: sdn.sap.com)

The SAP Community Network is an excellent model for online communities because:

- It is large; currently it has more than 1 million registered members.
- Its members are active in the SAP business which is a knowledge-intensive business.
- SAP AG is one of the largest software houses in the world. Their products include a wide range of knowledge management solutions; therefore the Community SAP created is also very professional in terms of its IT solution and knowledge management practices as well.
- It is very well organized; the Community has rich online and offline features.

3.3 Methodology

Case studies have three categories according to Yin (1989), namely exploratory, descriptive and explanatory research. Independent of the category, research methods can be classified into two main types: qualitative and quantitative methods. (Myers 1997)

Exploratory research aims at gaining new insight into a little known problematic. (Routio 2007) It has a less defined, less procedural and more open format in which broader questions can be formulated with the goal of gaining more understanding of the nature of the problem. (Stebbins 2001, Zikmund 2003, White & Roth 2009) Eventually tentative theories and hypotheses can be developed for subsequent non-exploratory researches. (Glaser & Strauss 1967, Glaser 1995, Lofland et al. 2006) It involves creativity, discovery and lateral thinking. (Bawden 1986, Foster & Ford 2003) The methods used can be informal (e.g. discussions with employees, management, experts, etc.) or more formal such as in-depth interviews, case studies, and comparison with findings reached in comparables projects. (Joppe 2000)

Descriptive research has one main goal, i.e. "to describe the data as they occur" (Zaina 2007) In contrast to exploratory research, descriptive case studies require a theory to be in place as guidance for the research and are more structured and less open-ended. Often measurements and statistics are used to make the description accurate. (Babbie 2009)

Explanatory research seeks to identify the causes of the researched phenomena (Schutt 2006), which is its main added value compared to descriptive research. Typically one or more hypotheses are tested by accepting or rejecting them based on the data collected in the research. (Perry 1998)

Qualitative research is described as "the non-numerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships" (Babbie 2009). In particular, qualitative research methods enable researchers to study social and cultural phenomena (Kaplan & Maxwell 1994). In practice, qualitative research involves the use of qualitative data acquired in interviews, documents, action

research, case studies or participative observation to understand and explain social phenomena.

Quantitative research methods were mainly developed in natural sciences to study natural phenomena. Quantitative methods are defined as “the numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect” (Babbie 2009). Quantitative research is sometimes linked to the notion of science as “objective truth.” Examples of quantitative methods are survey methods, laboratory experiments, and so on.

Case studies excel at emphasizing detailed contextual analysis of a limited number of events or scenarios and their relationships in depth. (Darke & Shanks & Broadbent 1998, Walsham 1995) Social scientists have made wide use of this qualitative research method, mostly due to a lack of quantitative options, to examine contemporary real-life situations and provide the basis for the application of theories and extension of methods. (Yin 1989, Eisenhardt 1989, Weiss & Bucuvala 1980) Case study research has been shown to be especially useful where "research and theory are at their early, formative stages" (Benbasat & Goldstein & Mead 1987, p. 369.), which is the case in the application of Fiske’s theory. The fact that case studies can combine exploratory and explanatory research (Yin 1989) allowed the case study of Intenzz SAP Consulting Group to use explanatory research for G1 and exploratory approach for G2 and G3.

The following chapters describe how the case study methodology was used for the two organizations introduced in the previous chapter.

3.3.1 Case study of Intenzz SAP Consulting Group

As mentioned before, this case study uses explanatory research for G1 and exploratory research for G2 and G3. The latter two goals couldn’t have been reached in an explanatory approach, because the available understanding of the complex problem of knowledge sharing is not sufficient (as explained in Chapter 2.2.) and hypothesis-test based on representative sample was out of realizable scope of the research. This means that in case of G1, proving or disproving the hypotheses (H1 and H2) was the primary aim of the

explanatory research. Considering that G2 and G3 were researched in an exploratory approach, it was not of primary importance to test hypotheses. H3 was formulated as an example for further hypotheses which can be derived from the exploratory research.

This research combines qualitative and quantitative approaches and consists of the following four methods:

1. First an online survey was conducted among the employees of Intenzz. This helped to identify the most common knowledge sharing scenarios inside Intenzz and gather qualitative data about the usage of the four relational models.
2. Management was interviewed to review the list of processes in the online survey. This resulted in a longer list of processes.
3. Based on the output of the online survey and interviews with management, business process models and based on these models, knowledge process models were created. The knowledge process models show what knowledge processes are present and what kind of knowledge sharing takes place within Intenzz.
4. Interviews with the employees were conducted to analyze all the scenarios which were not covered in the online survey.
5. Finally, recommendations and guidelines were created based on the findings and connections were built between this and another research project conducted at Intenzz.

The following chapters describe these four steps in detail.

3.3.1.1 Online survey

Online surveys are very useful to gather quantitative data. They are online, modern, and can look trendy, which is generally speaking attractive for respondents. Being online gives freedom to respondents to choose the location and timing of completion. Online surveys allow for a combination of giving information and collecting information. The beginning of the survey gives a short explanation about the topic, defines the basic terms, etc. so that the respondents can provide relevant answers. These aspects make online surveys very powerful research techniques.

Before conducting an online survey at Intenzz, a pilot survey was created at company X. (The company requested anonymity.) This survey does not deliver any input for this research; it was just used to fine-tune the research technique. Since the pilot survey ended up being very informative, it became a research project in its own right; nonetheless from the point of view of this PhD research, it was just a pilot.

Companies that are most advanced in their knowledge management practices, in other words, companies which are the most successful in transforming their tacit and explicit corporate knowledge into new enterprise intellectual capital and increased shareholder value, are awarded the Global MAKE (Most Admired Knowledge Enterprises) prize. The MAKE Report is published by Teleos. Company X received this prestigious title in 2006. The winners were selected by a panel of Global Fortune 500 senior executives and internationally-recognized knowledge management/intellectual capital experts. The panel rated organizations against a framework of eight key knowledge performance dimensions which are the visible drivers of competitive advantage and intellectual capital growth.

The web-based survey was available at http://www.tamasszirtes.com. It was anonymous, partly multiple-choice and partly free entry-based. A news item was published in the Global Enterprise Portal of company X (Figure 10); therefore employees worldwide had the opportunity to participate in the survey. This ensured random selection of the respondents. Each had to answer questions regarding 3 situations. 17 employees completed the survey; 2 of them entered only 2 situations. In all 49 situations were available for evaluation. No additional information was provided to employees; all that they noticed was a news item in the portal asking them to participate. Answers were anonymous; data were handled confidentially, i.e., the log file contained all answers, but no reference to the identity of the respondents.

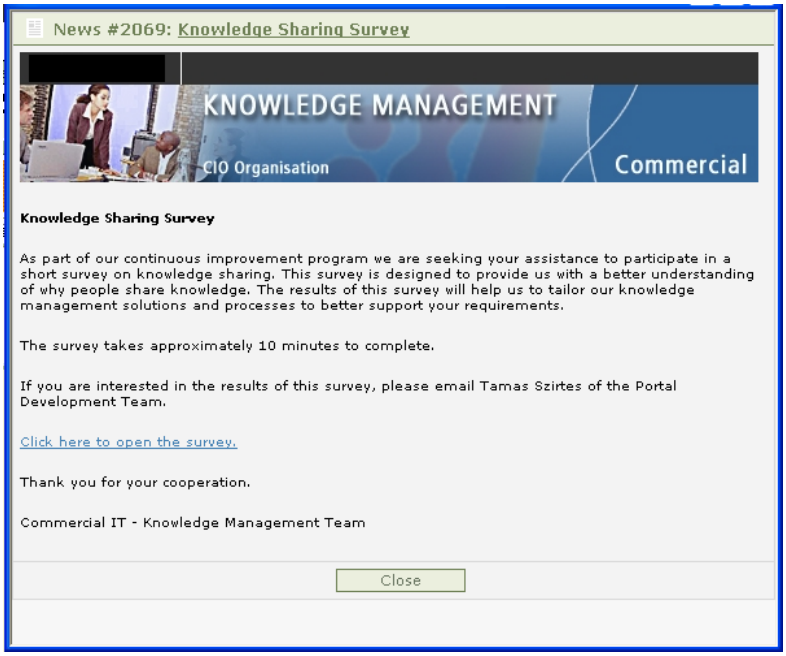


Figure 10: The news item in the Enterprise Portal of the Company

(Source: The Enterprise Portal of the Company)

This pilot was very successful; the Global Knowledge Officer found the results applicable to the business. Even though the pilot worked well, there were some lessons learned:

This pilot survey consisted of almost the same screens as the final survey (see screenshots in Appendix 7). One big difference was question number 4. In the pilot survey it was formulated as follows:

4. Which of the below sentences describes your knowledge sharing the most?

"We just all try to do what we can, and that's different for everybody."

"It is not a matter of free will, I have to share my knowledge."

"Now it is my turn to help, I owe you one."

"As long as they are paying me enough for my expertise, I will share my knowledge."

“None of the above”

The report produced for the Company gave the following judgment: “Q4 is very distributed, it gives no clear indication. Taking the answers to Q1-Q3 into consideration, these values can most probably be explained by the failure of the survey, i.e., this question was hard to understand and answer properly.”

Considering this, the final survey used at Intenzz approached the same topic with different, more explicit wording:

4. Which of the below sentences describes your knowledge sharing the most?
   "We all try to share our knowledge. Some have more, some have less knowledge."
   "I didn't decide to share my knowledge, I have to."
   "Sometime I help others, sometimes others help me and I find it important that it is in balance."
   "As long as they are paying me enough for my expertise, I will share my knowledge."
   "None of the above"

Another lesson was that publishing a notice in the intranet portal is not enough marketing for such a survey. While the pilot survey followed a passive approach, the final survey at Intenzz was distributed via email and all employees were asked to help and devote some time to it.

The screenshots of the survey and the data structure saved during data entry can be found in Appendix 7.

Regarding the technical aspects of the survey, it was hosted on a server owned by the author; it was available under tamasszirtes.com; it was programmed by the author in Microsoft Active Server Pages (ASP), HTML, JavaScript, and CSS languages, and it was thus published on the Internet. Technically it was available to anybody, but data were only submitted by users who got the link to the survey. This can be verified as the survey saved the IP address of the respondent for each answer.

3.3.1.2 Interview with the management

The online survey resulted in a long list of knowledge sharing scenarios. The problem with the answers was that the same scenarios were formulated differently by different people. Interviewing management helped to group scenarios, discover what scenarios were not mentioned in the results of the online survey and finalize a comprehensive list which

covers all scenarios. This complete list was used further on in the knowledge process modeling phase of the research.

Two sales and two delivery managers were present during the interview. It took 2 hours and the agenda was as follows:

1. Introduction to the research
2. Explanation of the research goals
3. Explanation how this interview fits into the whole research
4. Demonstrating the online survey results
5. Discussing the data
6. Creation of "umbrella terms", i.e., generic names for the scenarios
7. Categorization of the scenarios into "umbrella terms"
8. Identification of the missing scenarios

Example: Scenarios such as "Attending the Visual Composer meetings" and "BPM focus area meeting" and "eSOA discussions with colleagues" were categorized as belonging to the "umbrella term" "Working in teams".

3.3.1.3 Knowledge Process Modeling

In order to show that the relational model describes knowledge sharing inside Intenzz, we need to identify the knowledge sharing scenarios inside the organization. The approach taken was to model all business processes which the survey results covered – after the cleansing completed in the management interviews. The challenge was, however, to derive knowledge processes from the business processes. As Strohmaier (2005) states, "Although today's organizational knowledge management initiatives already focus on multiple business processes rather than on a single business process, surprisingly neither existing process standards nor existing business process modeling techniques nor knowledge management approaches provide comprehensive concepts on how to tackle the identified challenge."

Indeed, very commonly the focus in the modeling of business processes is on the modeling the "flow of work" rather than the "flow of knowledge" in organizations, which is the main

goal in the modeling of the knowledge processes (Strohmaier 2003). Of course most processes in a knowledge-intensive organization, such as Intenzz, are knowledge-oriented, but still, there is a difference between knowledge-oriented business processes and actual knowledge processes. (Probst & Raub & Romhardt 1999) Remus and Lehner (2000) calls knowledge-oriented business processes knowledge-intensive operative business processes and states that "they use knowledge in order to create the process output as well as for handling the process itself". (Remus & Lehner 2000, p. 1.) On the other hand, knowledge processes "support the flow of knowledge between business units and processes as well as the creation and collection of knowledge. This can be processes supporting the collection, processing and storing of information as an outcome of conventional business processes." (Remus & Lehner 2000, p. 1.) In practice it means that in the knowledge processes each step has to be possible to map to knowledge generation, storing, transfer or application (as defined in chapter 2.1.3 about knowledge management processes). Process steps of business processes, on the other hand, can be of any content, there is no requirement that they have to be possible to map to the above mentioned four KM processes. An example is the first step in BP3: "offer knowledge session". In knowledge-intensive organizations some business and knowledge processes can be close to each other, nevertheless the explicit modeling of the knowledge processes has multiple benefits, as explained in the following paragraphs.

Categorization of the knowledge process steps was realized based on ideas from Strohmaier's (2005) B-KIDE framework. This framework has been developed to design knowledge infrastructure based on knowledge processes. Consequently, the framework could not be used completely, because the goal of this research was to analyze knowledge sharing and not to define the knowledge infrastructure based on the knowledge processes. Nevertheless, the idea of mapping business processes to knowledge processes has been adopted. The relationship of business processes and knowledge processes is illustrated in Figure 11 and a deeper view is provided in Figure 13. Among other, it describes how knowledge is generated in business processes and can be stored, transferred and applied to enhance the performance of business processes.

Figure 11: Business and knowledge processes

(Source: Strohmaier 2003, p. 6.)

The cornerstone of the B-KIDE framework is the B-KIDE tool (see Figure 12) developed by Strohmaier (2005). Even though this tool is not used in this project, the construction principles of the software are very relevant.

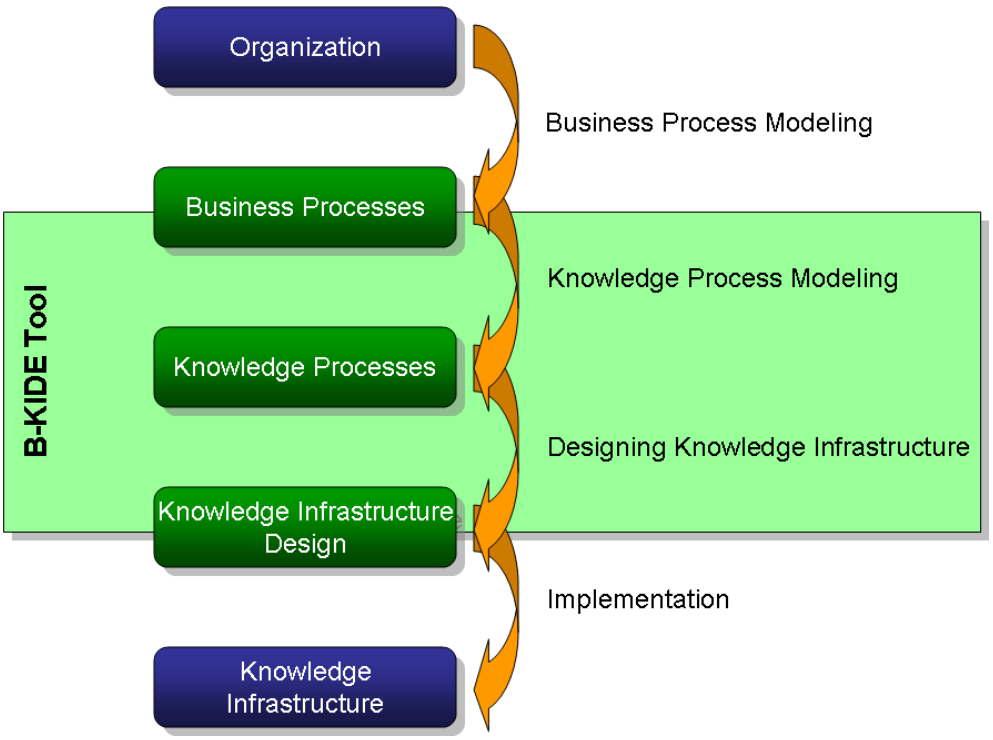


Figure 12: Scope of the B-Kide Tool (Source: Strohmaier 2005, p. 100.)

The B-KIDE framework maps complete business processes to the four knowledge processes: knowledge generation, knowledge storing, knowledge transfer and knowledge application. (Figure 13)

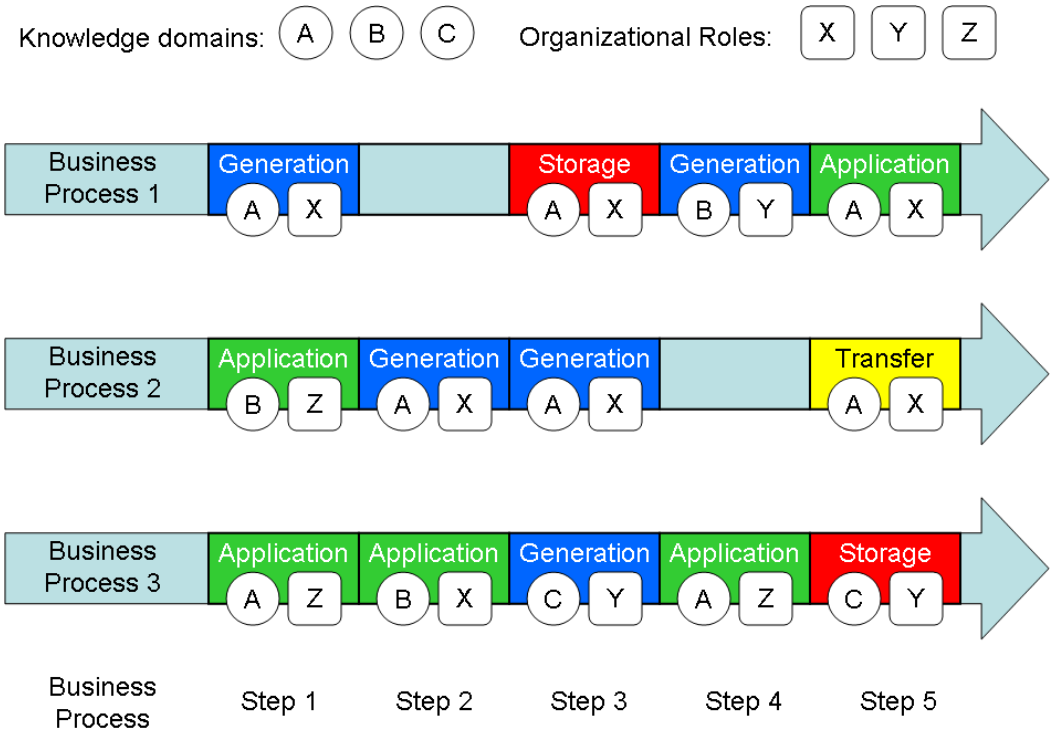


Figure 13: Modeling Knowledge Work of Business Processes

(Source: Strohmaier 2005, p. 68.)

Since this research is interested in knowledge sharing inside Intenzz and not within the organization of the customers of Intenzz, there is no benefit in analyzing the complete business processes which contain process steps taken by customers or other business partners. Therefore this research only categorizes the process steps taken by Intenzz employees into the four knowledge processes. The following table structure (Table 6) is used:

Table 6: Structure for mapping knowledge sharing steps (Source: own analysis)

Business Processes	Knowledge Generation	Knowledge Storing	Knowledge Transfer	Knowledge Application
BP<ID>	Step<ID>	Step<ID>	Step<ID>	Step<ID>

The columns are the four knowledge processes, the rows are the business processes and the cells contain the process steps which are applicable.

The benefit of making knowledge processes explicit means that they can be managed more efficiently and at a lower cost and the captured knowledge is of higher quality. (Kalpic and Bernus 2006) Remus and Lehner (2000) as well as Palkovits and Woitsch and Karagiannis (2003) mention more benefits: 1) knowledge is linked to the business processes; therefore information can be provided in a more targeted way, e.g. minimizing information overflow. 2) knowledge (and knowledge needs) can be interpreted better because they are in the context of business processes. 3) all the process improvement methodologies can now be used for the knowledge processes as well 4) explicit knowledge process models support cost planning and organizational role assignments 5) knowledge management systems can be better designed to support explicit processes.

In recent years increasing research (e. g., Heisig 2001, Jablonski & Horn & Schlundt 2001, Abecker et al. 2002, Remus 2002, Choi & Jung & Song 2004) has been performed in the domain of business process oriented knowledge management (bpoKM). For the purpose of modeling many custom-developed methodologies and tools have been developed such as PROMOTE (Woitsch & Karagiannis 2003), K-Modeler (Gronau et al. 2003), WORKWARE (Jørgensen 2004), KBPI (Dalmaris 2006), KnowMore (Abecker et al. 2000), etc. Absent standards or even widely used practices in bpoKM, the author decided to apply a BPM standard, BPMN 1.0. (OMG 2006)

BPMN is a proved technique to model business processes. BPMN provides a notation, a business process diagram in a flow-chart format that is readily understandable by all business users, from the business analysts that create the initial drafts of the processes, to the technical developers responsible for implementing the technology that will perform those processes, and finally, to the business people who will manage and monitor those processes. Thus, the promise of BPMN is to offer a standardized bridge for the gap between the business process design and process implementation. In order to keep using standards as much as possible in this PhD project, even the knowledge processes were modeled in BPMN. There are three basic types of models within BPMN: private (internal) business processes, abstract (public) processes, and collaboration (global) processes. A collaboration process depicts the interactions between two or more business entities. The

collaboration process can be shown as two or more abstract processes communicating with each other through so-called touch-points, which are the connection among the abstract processes. In this project collaboration processes are used, as shown in Appendix 6.

In BPM projects tool selection is always difficult, because different tools have different strengths and weaknesses and only few of them support translation to BPEL, which is critical for "executable BPMs", i.e., business models which can be turned into processes running in an enterprise computer system. Since executing the models was outside the scope of this research, a very user-friendly and very widely available tool was chosen: Microsoft Visio 2003. Since the out-of-box MS Visio does not support the BPMN 1.0 standard, it does not have all the shapes necessary to draw BPMN-based models. Version 1.1 of the "Frapu-BPMN_Template.vss" stencil had to be imported into Visio. This stencil adds the BPMN notations to the Shapes list in Visio. It is freely available at http://workflow-research.de/Downloads/BPMN/ from Workflow Research (2003). "Workflow Research is maintained by Michael zur Muehlen as a repository of papers, presentations, and links on the topics of process orientation, management of process organizations, and workflow automation in general." (Workflow Research 2003)

3.3.1.4 Interviews with the employees

This research phase involved 20 randomly selected employees who were asked to fill in a questionnaire that investigated their motivation for knowledge sharing. The questionnaire can be found at Appendix 8. The reason why this round of interviews took place was to collect data for the scenarios which a) were not mentioned in the online survey or b) were not mentioned often enough, i.e., the data gathered were not sufficient to draw conclusions.

3.3.1.5 Creation of guidelines and comparison with the findings of the research project "Coordination and Knowledge Transfer within Teams"

The four models and the patterns were analyzed based on the added value created by them and an ordered list of patterns was set up. In this list the first item describes the knowledge

sharing pattern which delivers the highest quality in knowledge sharing and the last item is the lowest in quality. As a next step, based on the analysis of the knowledge sharing patterns, practical guidelines were created for Intenzz. Finally, a typical exploratory research technique, a comparison to another research was done. This other research titled "Coordination and Knowledge Transfer within Teams" was conducted by Snoeren (2009) completely independently of this research. Since both research investigated knowledge sharing at Intenzz, it offered an excellent opportunity to compare them in order to make the guidelines of this research more founded.

3.3.2 Case study of SAP Community Network

The case study of the SAP Community Network is based on a combination of qualitative and quantitative research methods. The qualitative methods used were participant observation, text analysis, and narratives. Survey results were used as quantitative method. In order to ensure quality, triangulation has been applied, i.e. multiple sources of evidence have been used to increase the credibility of the results. (Miles & Huberman 1984, Yin 1989) Further, insider and outsider information sources are mixed, e.g. participant observation is a strong insider method, unlike text analysis, which is an outsider technique.

The research has been conducted in the following steps:

1. Identify all functional areas of SDN based on participant observation and (web site) text analysis
2. Assign research method(s) to each functional area
3. Conduct research and collect data
4. Analyze data and reach conclusion in each functional area if any or which Fiske's relational model(s) applied. See Appendix 3 for further details.

4 RESULTS

4.1 Findings in Intenzz SAP Consulting Group

This chapter summarizes the results of the four research steps used in this PhD project.

4.1.1 Analysis of the online survey results

Intenzz has 35 people on the payroll. Given that two of them are the owners, who did not participate in the survey and there are always people on holiday or sick leave, the 30 results can be considered complete. Each participant was asked to list three knowledge sharing scenarios, so 90 scenarios should be the total. In fact, only 79 were filled in completely, because some people named three scenarios, but did not answer all the questions for all three scenarios.

The 79 scenarios were organized in the structure shown in Table 7. The participants were named (anonymously) from P01 to P30. The scenarios selected by the participants were called S1, S2, and S3. The wording of the business processes were standardized and the scenario descriptions (entered by the participants in the survey) were assigned to a standard business process ID. Each participant for each scenario had to answer four questions. (See Appendix 7). These four questions are marked as Q1, Q2, Q3, and Q4. Q1 concerns the benefits gained from knowledge sharing, Q2 asks when the benefits will be realized; Q3 is the question when knowledge sharing would be stopped, and finally Q4 is about the narrative of the sharing. The values entered in the Q1-Q4 columns correspond to the answers given. If the participant selected the first option from the multiple options, "1" is entered, if the participant selected the second option, it is marked as "2" and so on. The multiple choices are set up in a way that option 1 corresponds to Communal Sharing, 2 to Authority Ranking, 3 to Equality Matching, and 4 to Market Pricing.

Table 7: the first six rows of the result table of the online survey (Source: own data)

Person	Scenario	Scenario Description	Bus Process	Q1	Q2	Q3	Q4
P01	S1	Function group meeting	BP02	3	1	5	3
P01	S2	When I've read/ heard something that may be interesting to all, via email and knowledge web	BP05	3	1	5	3
P01	S3	during lunch, coffee breaks, and out of office meetings with people from other companies.	BP07	5	1	3	5
P02	S1	Company meetings	BP10	3	1	5	3
P02	S2	knowledge web	BP11				
P03	S1	Training / assisting a new colleague. Mostly by on the job training; sometimes with planned training 'blocks'; always with him / her at the keyboard.	BP12	2	2	1	2

For example, the first row in Table 7 represents the following: One participant (marked as P01) decided that one of the three scenarios she/he wanted to mention in the survey was "Function group meeting". This was her/his first scenario; therefore it is marked as S1. S1 is basically BP02, just with other words. BP02 stands for "Working in teams". For the first question (Q1) the participant selected option 3 (which corresponds to EM), for the second question (Q2) option 1 (which corresponds to CS), for the third question (Q3) option 5 and the participant entered some free text (which was of course also saved (See Appendix 7), for the fourth question (Q4) option 3 (which corresponds to EM).

The conventions and unique identification of objects (processes, persons, questions, answers, etc.) helped to summarize complex relationships in relatively simple tables.

Based on the online survey results and a review by the management of Intenzz, the following business processes have been identified (Table 8):

Table 8: Business processes (Source: own data)

Business Process ID	Name of the Business Process
BP01	Consulting the customer
BP02	Working in teams
BP03	Preparing a knowledge session for a customer
BP04	Sharing lessons learned from a training session
BP05	Discussing a topic in email or Instant Messaging
BP06	Giving SAP trainings
BP07	Participating in knowledge sharing sessions with other consultants from other companies
BP08	Participating in VNSG focus groups
BP09	Representing the company at the VNSG Congress
BP10	Participating in company meetings
BP11	Uploading content to the portal
BP12	Teaching a colleague

When the participants selected the fifth option for any question, it shows that none of the above listed options were good enough. In this case they had to enter some text on their own. These instances are very important for the analysis of the results. Each of these texts was analyzed and the author reviewed them from the point of view of Fiske's Relational Models Theory (Fiske 1991) and tried to assign them to one of the four models. Table 9 lists all the distinct cases found. There were more occurrences when the fifth option was selected, but Table 10 only lists the distinct ones.

Table 9 shows what judgments were taken in case option 5 of the multiple choice questions was selected. This was necessary because participants were not familiar with the Relational Models Theory (Fiske 1991) and sometimes did not realize that one of the options is relevant for them, or the options were not written in a way that they could recognize them and they decided to choose option 5 and enter some text. If the text entered does clearly correspond to one of the four models, a correction was made. Each time option 5 was selected, it was corrected. The question here was whether it was possible to correct and what the correction should be. In other words, does the free text correspond to one of the four models or not. If yes, to which one? Option 5 was selected many times, but again, for the analysis of the results only distinct cases are interesting. Table 9 lists the so-called distinct correction cases from 1 to 19.

Table 9: Distinct correction cases (Source: own analysis)

Correction Case	Person	Scenario	Bus Process	Question	Correction
CC01	P01	S1	BP02	Q3	1
CC02	P01	S2	BP05	Q3	1
CC03	P01	S3	BP07	Q1	1
CC04	P02	S1	BP10	Q3	1
CC05	P03	S2	BP01	Q3	2
CC06	P06	S1	BP01	Q1	4
CC07	P06	S2	BP05	Q1	1
CC08	P07	S1	BP05	Q3	
CC09	P08	S1	BP01	Q1	4
CC10	P09	S1	BP05	Q3	1
CC11	P09	S1	BP05	Q1	1
CC12	P09	S2	BP12	Q3	1
CC13	P09	S3	BP02	Q3	1
CC14	P10	S2	BP02	Q1	3
CC15	P10	S2	BP02	Q3	3
CC16	P10	S3	BP01	Q1	2
CC17	P10	S3	BP01	Q3	4
CC18	P11	S2	BP01	Q1	2
CC19	P11	S2	BP01	Q3	1

It is noteworthy that each free text entered as option 5 answer could be assigned to one of the four relational models. (See Appendix 5) CC08 is different from all the others, because this correction case describes asocial behavior. Fiske described asocial behavior in the following way: “People are not interacting for the sake of the relationship as an intrinsic good or as an obligatory standard, but are using the other person purely as a means to some ulterior or nonsocial end.” (Fiske 1992, p. 708.) Asocial behavior is outside the Relational Models Theory; therefore we cannot assign a correction to it. This value will not be usable for the calculations.

Per the corrections in Appendix 5, Table 10 shows how many times the four models can be found in each business process.

Table 10: Frequency of the four models per business process (Source: own analysis)

Bus Process	CS	AR	EM	MP
BP01	15	28	13	15
BP02	48	15	43	5
BP03	-	-	-	-
BP04	6	3	0	0
BP05	45	15	18	0
BP06	-	-	-	-
BP07	6	0	4	0
BP08	-	-	-	-
BP09	-	-	-	-
BP10	5	0	5	0
BP11	5	5	0	0
BP12	13	8	0	0

Given that some business processes were not mentioned often by the participants, these did not get enough data for a thorough analysis. Consequently, only BP 01, 02, 05, and 12 can be considered. In order to get data for the other processes (grayed out in Table 10) these processes were included in the interviews, which formed the next phase of the project.

Another conclusion we can draw is that the most common knowledge sharing processes within Intenzz are working in internal teams, having email discussions with colleagues and consulting the customer. (Table 11) Considering the profile of Intenzz, this finding is perfectly in line with reality.

Table 11: Common knowledge sharing processes (Source: own analysis)

Business Process		CS	AR	EM	MP	Total
BP02	Working in teams	48	15	43	5	110
BP05	Discussing a topic in email/IM	45	15	18	0	78
BP01	Consulting the customer	15	28	13	15	70
BP12	Teaching a colleague	13	8	0	0	20

Beyond these purely statistical conclusions, Chapter 4.1.3. and 4.1.4 will zoom into the processes and draw further conclusions about knowledge sharing at Intenzz SAP Consulting Group.

4.1.2 Analysis of the interviews

The interviews, conducted based on the questionnaire in Appendix 8, gave the following results (Table 12):

Table 12: Interview results (Source: own analysis)

Business Process		CS	AR	EM	MP
BP03	Preparing a knowledge session for a customer	11	1	3	6
BP04	Sharing lessons learned from a training	8	5	8	0
BP06	Giving SAP trainings	0	13	0	8
BP07	Participating in knowledge sharing sessions with other consultants from other companies	7	6	8	0
BP08	Participating in VNSG focus groups	3	12	6	0
BP09	Representing the company at the VNSG Congress	0	10	3	8
BP10	Participating in company meetings	11	6	4	0
BP11	Uploading content to the portal	12	3	6	0

Since these results were produced in a face-to-face conversation with the author, there were no misunderstandings or incomplete options. Each answer given could be mapped into one of the four relational models.

4.1.3 Analysis of the Business and Knowledge Process Models

Based on the list of business processes reviewed and extended in the interviews with management, detailed business process models were created. (See the business process models in Appendix 6)

Table 13 shows how the knowledge processes within Intenzz can be mapped to the conceptual knowledge management processes based on the B-KIDE framework (Strohmaier 2005, p. 68.), as described in Chapter 2.1.3.

Table 13: Mapped knowledge process steps (Source: own analysis)

Knowledge Process ID	Knowledge Generation	Knowledge Storing	Knowledge Transfer	Knowledge Application
KP01	Step1, Step4	Step4	Step2, Step3, Step5	
KP02	Step1, Step2	Step2	Step3	
KP03	Step1, Step2	Step2	Step3	
KP04	Step1	Step2	Step3	
KP05	Step1, Step2	Step2	Step3	
KP06	Step1, Step2		Step3	
KP07	Step1	Step4	Step2, Step3, Step5	
KP08	Step1	Step4	Step2, Step3, Step5	
KP09			Step1	
KP10			Step1	
KP11	Step1	Step2	Step3	
KP12			Step1	

In each business process, the knowledge process has been identified. (See the details in Appendix 6) Note that only the knowledge processes are interesting which take place on the side of Intenzz consultants, since the purpose of this research is to analyze knowledge sharing within Intenzz. The analysis of knowledge processes can focus on the organizational aspects, the supporting system infrastructure and the improvement of the processes themselves.

The analysis of the knowledge processes can bring benefits for the organization and the employees. Process models can create clarity about how processes should be executed. Consultants work very closely together, help each other by giving advice to each other (KP1, KP7, KP8), work on solutions collaboratively (KP2, KP3, KP5, KP7, KP10), and explicitly educate each other (KP4, KP12). This requires a certain mindset and needs to be supported by the company culture. This analysis can help to fit the process with organizational and behavioral aspects of the company, either by modifying the process or adjusting the organizational aspects. For example, in the company meetings (BP10) all participants are expected to provide input. This requires a high level of openness in the organization. In the hiring and firing of employees this understanding should be reflected as well.

Another strong benefit of the analysis of the knowledge processes is the fact that based on the deeper understanding of the processes the supporting IT infrastructure can be optimized. Many knowledge processes rely on searching (KP1, KP2, KP3, KP5, KP7, KP8), which indicates the necessity of having an efficient search facility inside the company. On the other hand, there are situations such as the VNSG Congres, where the searching is not included in the process. The Intenzz consultants who represent the company in this fair have to be able to answer questions on the spot. Understanding this requirement helps the selection of the right representatives.

Having knowledge processes modeled allows for open discussion about them and creation of best practices. Unnecessary steps can be eliminated or certain process activities can be performed more efficiently. For example, the step of informing colleagues about the new information after the upload of the new information (Step3 of BP11) is a step which could be eliminated if the portal is able to send out automatic change notifications.

The above points are examples how the analysis of knowledge sharing helps in decisions about corporate culture, business processes, information technology infrastructure, etc. Such statements could be made based on the other three knowledge processes too, for example, the requirements for a good storage facility can be derived from the knowledge storing processes, but in this research knowledge sharing is in focus.

4.1.4 Relational models within Intenzz SAP Consulting Group

Table 14 shows how the votes got distributed among the 4 models per business process. The values are rounded percentages.

Table 14: Relational models in the business processes (Source: own analysis)

Business Process ID	CS	AR	EM	MP
BP01	21	39	18	21
BP02	43	14	39	5
BP03	52	5	14	29
BP04	38	24	38	0
BP05	58	19	23	0
BP06	0	62	0	38
BP07	33	29	38	0
BP08	14	57	29	0
BP09	0	48	14	38
BP10	52	29	19	0
BP11	57	14	29	0
BP12	63	38	0	0

We can consider a given business process predominantly CS based if the number of votes it received for CS is higher than the AR, EM or MP votes. The same applies for predominantly AR, EM, and MP processes. Following this logic Table 15 categorizes the business processes into four groups.

Table 15: Business processes categorized by their predominant relational model (Source: own analysis)

Category	Business Process ID
Predominantly CS	BP02, BP03, BP04*, BP05, BP10, BP11, BP12
Predominantly AR	BP01, BP06, BP08, BP09
Predominantly EM	BP04*, BP07
Predominantly MP	none

*BP4 got equal amount of CS and EM votes and will be covered in the Predominantly EM category (arbitrary choice).

As mentioned before, the relational models theory does not contain implementation rules. Which model is applied in which situation and how agreement is reached about these choices is not in the domain of the theory, rather the decision of the actual participants. In some cases, there can be a conflict between the models. Sharing knowledge with the customer is predominantly a MP-based relationship. This is, after all, how a consulting firm like Intenzz makes money. The customer is charged for the knowledge sharing, usually on an hourly base. On the other hand, in case of long-term relationships, when the consultant has rapport with the customer, the relationship is already partially personal; some traces of the CS model show up. This can lead to a conflict. Shall the consultant act

based upon his/her commitment/personal ties to the customer or based on business rules of the firm? As mentioned, there is no rule regarding this; good consultants are distinguished from the others if they can handle tactfully this conflict.

BP01, BP06, BP07, BP08, and BP09 are not completely internal oriented, i.e., in these processes there are participants from outside Intenzz. The rest of the processes, listed in Table 16, are internal:

Table 16: Internal business processes (Source: own analysis)

Business Process ID	CS	AR	EM	MP
BP02	43	14	39	5
BP03	50	0	20	30
BP04	40	20	40	0
BP05	58	19	23	0
BP10	50	30	20	0
BP11	60	20	20	0
BP12	63	38	0	0
Average	52	20	23	5

Table 16 shows that 52% of the internal processes are CS-based, 20% AR, 23% EM, and 5% MP. This demonstrates very clearly that knowledge sharing within Intenzz occurs predominantly based on the CS model. As concluded above, CS allows for the deepest knowledge exchange; therefore the predominance of CS inside Intenzz is a very positive sign.

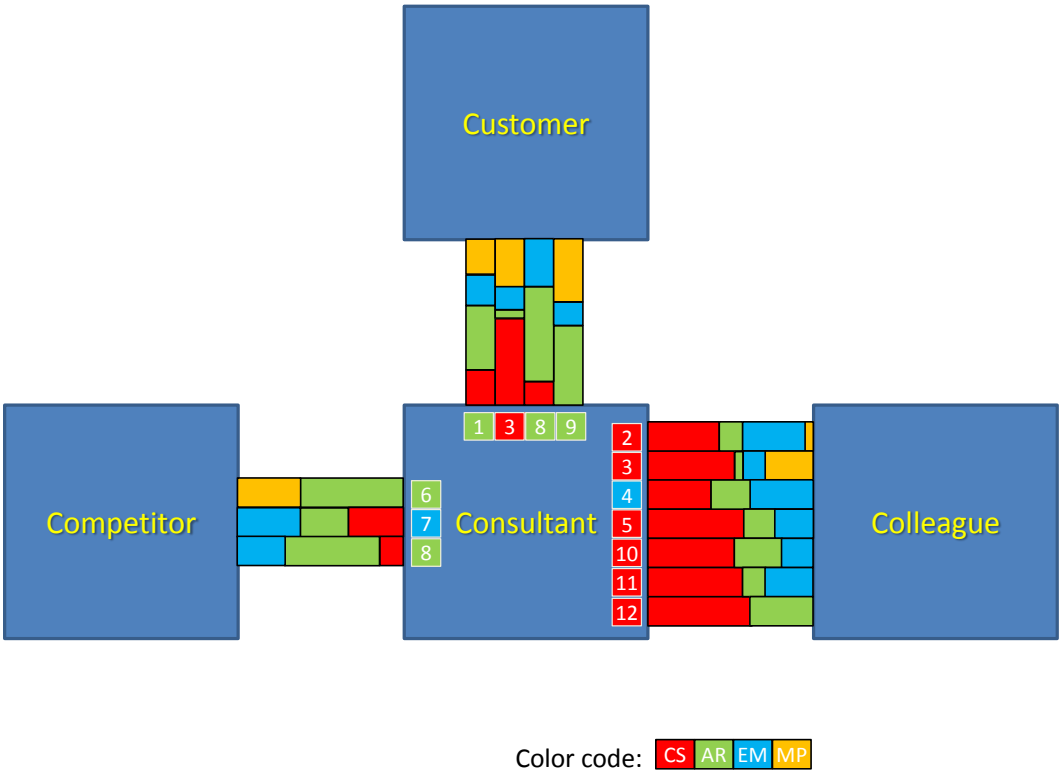


Figure 14: Relational models in the business processes (Source: own visualization)

Figure 14 summarizes most of the data in a visual form. The consultants are in the middle, who can share knowledge with colleagues, customers or competitors (e.g. in trainings). The lines among these actors represent the business processes which link them. They are numbered from 1 to 12 in the middle of the figure. The lines are color-coded; the distribution of the four colors shows exactly the distribution of the four models (CS, AR, EM, and MP). The numbers 1 to 12 are color-coded too, showing which model is dominant in the business processes. This visualization has the power that some observations and conclusions can be drawn very easily. For example, the number of lines shows the variety of knowledge sharing. There are many processes between the consultants and their colleagues, less between consultants and customers and even less between consultants and competitors. Between consultants and colleagues there is a lot of red, so the dominance of CS is obvious. Some processes, e.g. number 8, can appear twice, which shows that more than two actors are involved. Just looking at the colors, it is easy to see that MP is not much used between consultants and colleagues.

For each of the 12 processes the patterns of the four models have been analyzed. The following chapters summarize the main results of this analysis in the four categories defined in Table 15.

4.1.4.1 Predominantly CS business processes

Three observations can be made about the predominantly CS business processes:

- When sharing knowledge internally in teams or Communities of Practice (BP02) or when preparing a knowledge session for a customer (BP03), as expected, CS is the strongest model, but EM is important as well. It can be explained by the fact that some Intenzz consultants were hired 2 years ago (when the company was founded) and reached CS already, and the recently joined employees use EM. Some participants share knowledge based on AR in a team only to gain reputation or because they think they are expected to do so by their bosses. The 39% MP in BP03 indicates that some consultants participate just because this is an activity which is paid by Intenzz. (If a consultant spends an exceptional number of hours on pre-sales, then the owners will compensate him financially at year-end.)
- In the business processes of discussing a topic in email or Instant Messaging (BP05), participating in company meetings (BP10), and uploading content to the portal (BP11) with the exception of MP, the other three models are present. How far and how well a consulting company can manage this pattern influences greatly how successful it will become. This will be a main topic when management of patterns is discussed.
- When looking at the processes which received the highest percentage for any of the four models, the process of teaching a colleague (BP12) excels with 63% CS. It does not get rewarded financially (MP) and cannot be based on EM either if a senior consultant teaches a junior one, because the junior cannot "pay back" with comparable knowledge. Of course, AR is always involved in any training activity, but still, CS is clearly the main motivation. An example can be if a very experienced SAP Process Integration consultant shows a new colleague some useful tips and tricks in SAP. This behavior is very beneficial for the junior consultant as well as for the company; therefore when knowledge sharing patterns are managed, this should be encouraged.

4.1.4.2 Predominantly AR business processes

The predominantly AR business processes are as follows:

- Consulting the customer (BP01), the main business of Intenzz, is expected to be the very typical MP scenario in the sense that the consultant shares her/his knowledge until she/he is paid, but, interestingly, AR got the biggest number of votes for this process. The reason can be that reputation can be a reward for knowledge sharing whether the sharing is internal (with colleagues) or external (with customer). Even though it is predominantly AR, CS exists in the relationship with the customer as well. Consultants may spend many years at the customer organization and in terms of feelings, they may become part of that organization. It can develop to the point that the given consultant feels part of a community and is willing to share knowledge on CS terms. Since this can be in conflict with the MP approach, it can cause stress for the consultant, but managers can minimize the stress by managing this knowledge sharing pattern.
- When Intenzz consultants give trainings (BP06), AR is the strongest since Intenzz employees give trainings to improve their reputation in the market. Giving training to foreigners, to people whom the given consultant did not know before the training cannot be based on CS. There is no community feeling in this relationship at all. EM is missing too, because the students do not provide any reward; they only consume information. The reason why MP plays a smaller role could be that payment is not even certain; it is dependent on the evaluation ratings of the students.
- For participating in VNSG focus groups (BP08) building reputation (AR) is the key motivation for joining VNSG focus groups. EM is also present, because each time another member of the focus group gives a presentation, the consultants can be sure that they not only give knowledge, but also get knowledge from the others. Since the meetings are quite rare, approximately 3 times a year, there is no community feeling. Attendance varies a lot, because the meetings occur during office hours. The consultants have to choose between two models, either they join the VNSG focus group (mostly AR) or work on their project (mostly MP). Participation in the VNSG groups is not paid; it even comes with high opportunity cost. Therefore MP does not contribute to the motivation.
- There are really two main reasons why consultants attend the VNSG Congress (BP09), the largest SAP fair in the Netherlands: on one side, they are paid to attend (MP), and

on the other, they are present because everybody important is there, so building professional network and reputation (AR) is even more important than the paid hours. The EM votes may be explained by the thinking of some consultant: they are willing to answer questions about Intenzz and SAP in exchange for useful information about the customer, e.g., what projects will be started in the near-term, do they have a budget for certain SAP implementations, etc. It is a fair; visitors come in large numbers and, typically, there is no long-term relationship between a consultant manning a stand and a visitor asking questions. CS is completely missing.

- Interestingly the strongest AR process is the one which is also the strongest CS process: teaching a colleague (BP12) excels both as AR and CS. It can occur because teaching requires wide and very deep knowledge and in a teaching situation it is always very transparent who has this knowledge (the teacher).

4.1.4.3 Predominantly EM business processes

There are two predominantly EM business processes:

- When consultants share lessons learned from a training session (BP04) EM is just as strong as CS. The reason is the way trainings are organized, i.e. some consultants take part in some training while others pursue another training topic and at the end, they summarize what they learned to each other. Clearly, there are no hard incentives involved, MP got 0%.
- The process of participating in knowledge sharing sessions with other consultants from other companies (BP07) is interesting to compare with BP05 or BP02. AR is significantly stronger in BP07, because in these knowledge sessions the best consultants in the country participate and the judgment of this peer group is very important. Additionally, they know each other (e.g. from projects in the past), and their interest is extremely similar; therefore CS is strong even if the relationships cross the boundaries of their organizations and even if these organizations are competitors.

4.1.4.4 Predominantly MP business processes

Consulting is a very typical MP scenario in the sense that the consultant shares her/his knowledge until she/he is paid. Consultants are paid per hour; as long as there is payment, there is consulting service. When the payment stops, e.g., because the project has run out of budget, the service usually stops at that moment. Quite often consultants have lots of ideas how to help the customer, but if there is no budget, the knowledge sharing is not going to take place. Based on this BP01 is expected to be the very typical MP scenario, but, interestingly, AR got the biggest number of votes for this process – as discussed above. This shows that really good consultants don't work for their customers only based on the MP model (as shown in Table 16).

4.2 Findings in the SAP Community Network

When SDN was first launched in 2003, the expectation for eventual audience size was 500,000 members. SDN reached 600,000+ members in less than 3 years by 2006. BPX reached 60,000+ members in 5 months by 2006, 100,000 members by April, 2007. Currently 1.2 million individuals participate in SAP's online communities. (Schwandt & Gafni 2003) "Roughly 25,000 new participants sign up for these online communities each month, and from 2006 to 2007, the number of page views doubled, to more than 150 million. Participants contribute approximately 6,000 online posts per day and have created more than 60,000 wiki pages to handle ongoing discussions. More than four million posts have accumulated in these forums, and the pace of activity is accelerating. It took three years to reach the first million forum posts, nine months to reach the second million, and only six months to reach the third million. In total, more than 100,000 members have contributed their knowledge, experience and perspectives through the online discussion forums, articles, blogs and wikis hosted by SAP." (SAP 2008b) Currently SDN and BPX are offered in four languages: English, Chinese, Japanese, and Korean. Members come from more than 200 countries. "From the time a developer posts a question until she or he receives a response takes 17 minutes, on average, and two to three additional responses typically come in over the following 24 hours to refine and amplify the initial response.

About 85% of all discussion threads are closed as complete." (Hagel & Brown 2008) Page views increased from 20M in YE 2005 to 75M page views in YE 2006 and an estimated 150M in YE 2007. Active contributors increased from 740 in YE 2005 to 1,600 active in YE 2006, and 3,000 forecast by YE 2007. The number of unique monthly visitors increased from 200,000 in YE 2005 to 450,000 in YE 2006 to 550,000 in April, 2007. Member satisfaction increased on a 1-5 scale from 4.11 in YE 2005 to 4.19 in YE 2006 to 4.24 in February 2007. (Carey 2007)

The 2007 SDN/BPX Satisfaction Survey was filled out by 1508 Community members. On a scale of 1-5, where 5 is the highest, the overall satisfaction rating was 4.26. 63% of the respondents visit the Community daily. Some complaints in the survey show forms of addiction to the Community: "If I visited more often, I would not get any work done." or "If I spend any more time on BPX or SDN, my partner will leave me." For the question "How likely are you to recommend SDN or BPX to a friend or colleague?" the respondents could choose on a scale of 0-10, where 0 was "not at all likely" and 10 was "very likely", 59.3% of the respondents were "net promoters". "Net promoters" were defined as (% who gave scores 10 and 9) - (% who gave scores 6 to 0). The highly active community forums are the top-ranked feature in SDN and BPX, followed closely by library content (articles, how-to guides, and white papers), blogs, and the points-recognition system. (Elliott 2007a)

This Satisfaction Survey demonstrated some interesting facts about the demographics of the Community. 52% of the respondents were under 30 years old. 10% of the respondents were women. The five top countries in terms of number of respondents were India, USA, Germany, UK, and Netherlands. As Appendix 4 shows, 65% of the members are "techies" (35%+22%+4%+4%) and 31% are "business people" (20%+6%+5%). The majority of members are SAP customers.

This very fast growth has to be enabled by a well-performing infrastructure. "You click on a link and you get a response within two seconds almost anywhere on the planet. Uptime has been close to 99.99%, and our members have become far more productive." (SAP 2007a, p. 4.) As on most web sites, good performance and useful content result in better usage statistics: "The average user session has risen to 60 minutes since the upgrade, up from an average of 40 minutes previously, while a recent survey yielded a user satisfaction score of 4.2 out of a possible 5." (SAP 2007a, p. 4.) SAP always mentions very proudly

that the technical solution behind SAP Community Network is based on SAP software (SAP NetWeaver Portal). (Sochan 2004) Due to bandwidth burdens on the current infrastructure, and bandwidth bottlenecks for some users, online meetings and flash video are not currently part of the network experience, but are being evaluated, particularly as these newer formats begin to deliver a richer and more interactive experience. (Carey 2007)

According to Fiske et al., the four elementary models are discrete. People use combinations of the four models, but in a given social interaction, one of the four is dominant. This has been confirmed by various authors, but situation when multiple actors are involved, has not yet been analyzed. In such cases, different participants may interact along different models. The SAP Community Network is a fine example. It is called community; so community sharing is implied. In reality, most SAP consultants participate actively assuming equality matching, i.e., mutual benefits from sharing their knowledge. Employees of SAP administrate, moderate and contribute as well. They work along the lines of the authority ranking, since this is their job. SAP tries to position this community as the main source of information for SAP consultants. Therefore, they are trying to motivate consultants to contribute to the content. Authors, and even audience can collect points for their involvement. The points can be used to purchase SAP merchandise. This is a clear form of market pricing model. As a consequence, we can claim that some participants worked along EM, some followed AR, while others were motivated by market pricing.

4.2.1 Community Sharing Features

The Community can be found online and admission is free. Anybody can join; therefore the only bond among members is a common interest in SAP-related issues.

The social category of SAP professionals has a lot in common:

- Their focus (in terms of education and professional experience) lies in business administration and computer science (the combination of these varies by specialization in the various SAP areas.).

- Their professional career shows high correlation with the business success of SAP AG, the provider of the solution they work on.
- They have education in the same field, understand the same business trends and speak the same "technical lingo". (Which is very extensive in the case of SAP.)
- Their life and work style show similarities due to similar interests, business environment and remuneration.

The SAP Community Network uses online and offline operational methods. The main online methods, apart from the forums, are wikis, chat sessions, blogs, and the mentor program. The number one offline community feature is the Community Day.

Wikis are relatively new and successful features of the Community. Wikis raise some interesting questions regarding motivation. Many users add content because they heavily use the wikis as a consumer, and as a sign of appreciation they add content as well. This is Equality Matching. The problem is, however, that as the wiki is growing, an individual's contribution is relatively decreasing, which results in shrinking motivation to contribute. This is the famous prisoner's dilemma. (Spek 2008) For this reason, EM cannot explain the spread of wikis. Sometimes SAP offers benefits to wiki editors (based on MP), but still, wikis can be successful in the long term only on CS foundations.

Another popular feature of the Community is SAP chats. These are chatting sessions about latest technology or SAP solutions-related topics, scheduled to take place on a weekly basis. SAP chat participants include a mix of renowned business people, strategists, recognized thought leaders, and industry experts. (Mollenhauer 2003) They are encouraged to exchange ideas, not only with the assigned experts, but also among each other as part of closer peer interaction. They interact based on their interest/dedication to SAP topics, but also to build reputation in the Community. This is a case of a mix between CS and AR incentives.

Any volunteer member of the Community is allowed to publish articles. It is called blogging, even though it is practically just publishing an article. While blogging is permitted, SAP wants to ensure quality. For this reason, the relationship between blogger and the network is monitored by SAP Community Networks staff. When users indicate a desire to blog, they are asked by the network manager what they want to blog about. Then

they are inducted into the “Junior Blogger Program”, where they are monitored for the first four to five posts. After their initiation, they “graduate” to full blogger status. There are even “star bloggers”, whose recognition on the network can earn them tangible rewards and external recognition.

Jeppesen & Laursen (2007) showed that if there is a lead user, a person with outstanding knowledge in a community, then this user usually tends to reveal her/his knowledge to other users. The relative propensity to give knowledge, in comparison with the propensity to take knowledge from the community, increases with the experience of lead users. The SAP Community has realized this and introduced the role of SAP Mentor in 2008. SAP Mentors are defined as experts who are passionate about SAP and who differentiate themselves through the high quality and frequency of their community contributions, their perspectives, attitudes, and interaction styles.

Community Day, formerly known as SDN Day, is “a vibrant day of collaboration”. (SAP 2007b) The agenda covers speed networking, BOF sessions, and all kinds of interactive programs for Community members. Birds of Feather (BOF) is a shortening of the proverb "Birds of a feather flock together.", meaning that people (birds) of the same kind or interest (of a common feather) enjoy spending time (flocking) together. BOF denotes initial meetings of members interested in a particular issue. “A BOF session, an informal meet-up at conferences, is where attendees group together based on a shared interest and carry out discussions without any pre-planned agenda.” (SAP 2007b)

4.2.2 Equality Matching Features

EM is the predominant feature of the SAP Community Network. Members contribute in the hope of benefiting from other members’ contributions. They realize that it continues on being a useful source of information only if enough users (critical mass) are active. This is most commonly described as knowledge exchange.

The forums and the Lounge are the main realizations of EM, even though the forums have CS, AR, and MP aspects as well. In the forums participants can post topics, share best practices, request advice about SAP solutions, and can even rate postings.

SAP performs a strong marketing activity to promote the SAP Community Network. The following quote shows that the value provided to customers via endorsements is the fact that the Community stores a huge amount of information; therefore users can get real benefit. Somnath Manna, consultant with Tata Consultancy Services Limited, explains how SDN can be beneficial: "Before SDN, I had to depend on the few other consultants I knew to get an answer to a technical question. With SDN, scores of other consultants and users have visibility into the issue that concerns me, and I am sure to get high-quality answers quickly. Moreover, the information in the Wiki at the SDN site is from fellow practitioners, which makes it more relevant from an operations standpoint." (SAP 2008, p. 11.) Another community member, Mat Keijers, business manager at Getronics PinkRoccade notes, "The SDN site greatly simplifies finding relevant information about a host of areas, such as the SAP NetWeaver Composition Environment offering, enterprise SOA, and business process design and modeling. Through SDN we are kept up-to-date concerning developments in SAP products. For our developers, SDN is the main source of information and e-learning. Most of the issues that our developers encounter are solved within one to two days by using the forums at the SDN site. The how-to guides found at the SDN site help us both in product development and with implementation at the customer site, thereby reducing our development and implementation time." (SAP 2008, p. 11.)

These quotes demonstrate clearly that the marketing message of SAP is EM-based. Another indication is that one SAP presentation (Lehnen & Gallman 2004) about the Community is titled "Community Content for SAP NetWeaver: A Matter of Give and Take". Give and Take is the essence of EM. SAP needs to market the Community so heavily, because "selling EM" is not easy. It is based on a balance of giving and taking, but this balance to open to the interpretation of individuals, so there is ample room for debating what constitutes equality. Still another evidence is that SAP even publishes success stories and customer and partner testimonials about the Community. (Nguyen 2008)

4.2.3 Authority Ranking Features

As discussed before, AR comes in two forms: based on power or based on reputation. Power-based AR is present in the Community due to the involvement of SAP employees. Reputation, on the other hand, is also a major factor.

The SAP Community Network is not voluntarily organized by its members, but centrally by SAP AG itself. It is structured, developed, and maintained by SAP AG. A large portion of the content comes from SAP employees who contribute to the community as part of their job. 40% of the active contributors are from SAP and only 60% from customers, partners, independents, etc. (CAREY 2007, p. 3.) They do it for salary, following guidelines of their supervisors, i.e., authority. All in all, AR is a very important component in the SAP Community Network.

The role SAP plays in the Community:

- Architect/creator of the system
- Contributor of the highest credibility and competence. The creator of the solution (usually) knows the most about the solution. With the speed of innovation in the SAP arena, even very experienced professionals find it difficult to keep up with new solutions provided by SAP AG. In these cases support from SAP itself is in high demand.
- Motivator in the Community. By adding valuable insights and lots of content and offering a reward system, SAP tries to increase activity in the Community.

The next chapter will describe the point system of the Community, which rewards contribution based on MP. It results in a race for points, which starts at an individual level, but reaches the organizational level as well. Even companies compete to collect more points. For Wipro, one of the largest SAP consulting companies in the world, it was a question of reputation to be the first to reach 100,000 points in SDN. This reputational aspect of the Community follows the AR model. Table 17 shows the leading contributors in SDN.

The effort required to reach 100,000 points is enormous: ten-thousand answers had to be marked as "Solved my Problem". The best SDNers average 2 points per post, so Wipro needed fifty-thousand forum posts to hit the 100K. In Blogs on average one gets 50 points for a post; that means Wipro needed two-thousand posts to cross the 100K line.

Table 17: Top contributors. (Source: Finnern 2006)

Rank	Name	Points
1	wipro.com	100042
2	intelligroup.com	57380
3	cognizant.com	36829
4	satyam.com	30699
5	accenture.com	20378
6	btexx.de	17855
7	yorktwn.com	17225
8	aiv.kuleuven.be	14660
9	molex.com	13876
10	aramco.com.sa	12924

4.2.4 Market Pricing Features

The advantage of gaining knowledge is obvious for SAP professionals, but appreciating tangible benefits is “human” as well. Therefore SAP offers a point-based reward system that allows contributors to trade in points for small merchandize items.

The rules of the reward system:
“For more than a year, the Member Rewards program has been recognizing and rewarding members for their active participation in, and contributions to, the SAP Community Network. Now members can enjoy the Rewards items they earn by participating in the SAP Community Network without worrying about shipping costs. Each month, a select item from the SAP Shop will be available automatically to Rewards winners -- and we pay for shipping.

Earning a prize is still easy. Each time you log in to the SAP Community Network and interact with other members, participate in an event, respond to a survey, or subscribe to

our newsletter, you earn points. Once you earn 1,000, you are eligible for your Rewards item.

Participation in the Member Rewards program is automatic. You don't need to enroll in the program. As long as you're a registered member, you earn points every time you visit the SAP Community."

Key to the success and growth of SDN has been a novel awards program. Users can obtain points by providing answers to network questions, by publishing blogs, and by conducting online demos. Accumulation of points brings rewards. Members who accumulated 10 thousand points since last TechEd win free admission to the TechEd. (SAP TechEds are annual technical conferences, held on four continents, which attract 20,000 attendees.) Mark Yolton, Senior Vice President of the SAP Community Network, phrased it very clearly for the community members: "I'd like to see as many people as possible get free tickets (10k points by July 31) or half-price tickets (5k points by July 31) to TechEd, so keep blogging, answering forum questions, adding to the wiki, etc. We will treat you like royalty at TechEd with special VIP seating and other goodies. If you aren't close to these impressive point numbers, don't worry. We still want to see you at TechEd and Community Day. Maybe your near-term goal is to get to the next level (250, 500, 1000 points...) so you can proudly wear your SDN or BPX t-shirt or justifiably compare your point total with others. Also: Get going to build your points for next year!" (Yolton 2007)

A point system is not a unique technique only used by SAP, e. g. Sun's Developer Forums use Duke Dollars. In this scheme, members work with credits. Every user is given a certain amount of points (Duke Dollars) when they join. When one posts a question, one can assign a number of Duke Dollars upfront from one's available credit as a reward. The members can accumulate more Dollars by answering threads which have Dollars assigned. Every month, Sun gives a gift to the user who has accumulated the most points.

Point systems have their weaknesses as well. One upset member wrote: "What I also notice is that some people are just crazy for earning points. Here's a situation: Someone asks a question. One person answers with a great solution. An hour later, someone else gives the exact same answer and signs off with: Don't forget to give points! How silly is that? And for most: WHY? Why would you repeat an answer? For points? I thought this forum was

for people to help each other, but it seems that for some people it's just a way to elbow yourself into the picture. Sad...” (Brantjes 2005) In the 2007 Satisfaction Survey abuse of the points system has been identified as a negative influence on content quality. (Elliot 2007b)

Besides the strong MP incentive, the forums are part of community life and knowledge sharing takes place according to the CS model as well. Even AR is important, because participants can “rise” as experts. The EM aspect is also present, as discussed in the previous chapter.

An absolutely clear example of the MP model is the Premium Access Zone (PAZ) program of the Community. SAP offers premium content, such as conference video downloads or PowerPoint presentations, to end users for an additional fee.

A twist to the points system is the donation program set up in collaboration with the United Nations World Food Program, the world’s largest humanitarian organization in the fight against global hunger. SAP has committed a minimum contribution of €100,000 in 2008, but the members of the SAP Community Network can increase this donation. If total community points reach 3 million during 2008, then SAP will increase its donation to €150,000, 3.5 million or more community points will trigger a €200,000 donation. This is another incentive for members to be active and, as a reminder, the current number of points is always displayed on the right side of the Community main page – as shown in Figure 15.

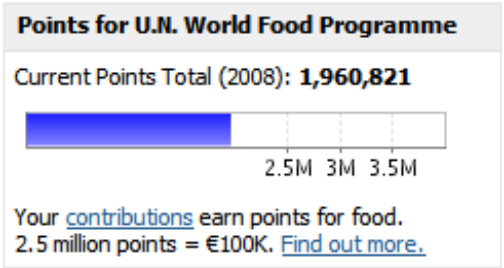


Figure 15: Screenshot about U.N. World Food Programme content on SCN (Source: sdn.sap.com, Aug. 9, 2008)

4.2.5 Summary of the findings

Most important to mention is that all the research data lead to the same conclusion: all knowledge sharing could be described by the four models or the combination of them. There were no examples which challenged Fiske's theory and were not possible to explain within the boundaries of the theory.

The SCN uses all four models, as shown in Appendix 3. 6 functional areas use CS, 4 areas use EM, 8 areas use AR and 4 areas use MP. The dominance of one or the other model cannot be established just based on these numbers, because the importance of the various functional areas is not equal. For example, as we have seen the forums constitute the top-ranked and most used feature of the SCN. These forums operate based on a mix of all the four models, but more on EM, AR, and MP. Considering that the SCN has more than a million members, only CS wouldn't be realistic, because the required community bond would not be possible to create for such a high volume. Therefore SAP is more focused on enabling CS for well-defined groups such as participants of a Community Day or the bloggers.

Appendix 3 also shows that, with the exception of the Premium Access Zone, all functional areas use a mix of at least two models. The success and rapid growth of SCN demonstrates that when various models strengthen each other the level of knowledge sharing increases. The next chapter explains how the interplay of various models can be influenced in a successful way.

4.3 Managing the patterns

The relational theory is called relational, because it reflects a view focused on the structure of relationships rather than on the attributes of people. People are not just oriented toward people on their own; they are thinking primarily in terms of relationships. Applying this to knowledge management means that management should pay more attention to relational structures and less to personal characteristics, because the primary motivation for knowledge sharing lies in the social relationships.

Different knowledge sharing situations are based on different models of social relations. While one situation can be clearly MP-based, another can be communal sharing. People can share knowledge with different people along different relational models. E.g., some people may feel comfortable sharing knowledge freely among each other, but when an outsider asks for information, she/he may need to pay for the information. It is not only different situations that follow different models, but even one situation can be shaped by different models. E.g., in a community-of-practice meeting participants can share knowledge freely (CS) or exchange books among each other (EM) that they earlier bought in a bookshop (MP). It is also possible that one party in the knowledge sharing relation behaves based on one model and the other party follows another model. This does not usually lead to successful knowledge sharing, but still this can occur. For example, if at a knowledge building meeting a participant refuses to tell something unless the others pay for the information, they function along very different models (CS vs. MP) and the relation will break down. Any two parties can engage in multiple knowledge sharing situations and they may follow different models. All these different usages of the models constitute the knowledge sharing patterns.

Understanding the patterns allows companies to manage them. If patterns are ignored or management is not aware of them, then knowledge management initiatives may bring questionable results – as demonstrated in Chapter 2.1 by the examples of Siemens, HP, IBM, etc. These examples of knowledge management programs have one characteristic in common: each company tried to introduce a “one size fits all” system. Knowledge sharing patterns were not analyzed; therefore results were unpredictable and partial. (APQC, 1999)

Patterns are managed in order to improve knowledge sharing. Measurement of the success is, however, far from being obvious. Not only the quantity (frequency) of knowledge sharing matters, but also the quality (content). Eventually, both factors should be taken into consideration and the value of the knowledge being exchanged should be the benchmark. Concrete measurement in reality is extremely difficult.

4.3.1 Challenges in managing the patterns

Fiske's theory states that the four models or combinations of them can describe each human relation. On the other hand, the models have no inherent content and no intrinsic referents; therefore the models do not determine themselves how they should be applied. There is no internal governance in the models. Application is up to the participants. A mismatch can exist and it can be very easily detected by participants since understanding models may be a very natural and standard mental process: Fiske (2006) discovered that the brain regions activated when people watch realistic videotapes of ordinary CS and AR interactions are quite different from activations produced by any other imaging study. "A plausible inference is that processing of social relations (reflectively and/or unconsciously) is a default activity of the human brain." (Fiske 2006, Fiske & Haslam 1997) However natural it is, there are two main challenges in these relations: null relation and mismatches.

Knowledge sharing can take place when a social relation exists among the participants. If there is none, then it is a situation which Fiske (1992) describes as null relation. Null relations are not rare; most of us have null relations with the vast majority of the world and that is completely normal. What is more interesting from a management point of view is null relations in situations where participants are close to each other, e.g., employed by the same organization. From a knowledge management point of view, null relations should be minimized, thereby fostering knowledge sharing. E.g., IT infrastructure can help minimize the extent of null relations inside an organization.

As Fiske (1992) stated, a mismatch can exist in the relational models. The three different types of mismatches are discussed in the following three chapters.

4.3.1.1 Disagreement about the implementation method

Disagreement about the implementation method means that participants agree on which model(s) to use, but they disagree on the way the model should be applied. For example, Intenzz employees agree that there is a need for team meetings (CS), but some employees would prefer more, others less meetings. Some prefer meetings in the evening (to keep their billability high); some prefer them during office hours (to avoid conflict with their

private appointments). Another typical example, this time MP based, is negotiating consulting rates with the customer. It is clear for both sides that eventually the services will be paid. MP will be the model. On the other hand, it is typical that the customer would like lower rates and Intenzz prefers higher rates; therefore there is a mismatch in the implementation of the relational model. An EM model can break down because of how the various participants interpret time. One may expect the return as soon as possible, while the other may think that there is no urgency; it is enough to gain a return at an undefined later point in time whenever convenient. Mismatch in the AR model can be caused by the matrix organizational model predominantly used in consulting companies. Any given employee has a business unit manager (permanent) and a project manager (temporary). Decisions can be based on this hierarchy, but if there is a conflict between the two, then it is a disagreement about the implementation of AR. An example of this conflict is when the business unit manager would like the given consultant to move on to another project to keep on learning new technologies and gaining new experience and the project manager would like to keep the given consultant in her/his current project, because otherwise the timely delivery of the project is at risk.

Another example of conflicting implementation rules relates to the challenge consultants have to break with their own past practices. Intenzz only hires senior consultants, to wit, all employees have previously worked in other organizations and many of them even worked at other consulting firms. They bring their experience not only in the field of SAP, but also in knowledge management. They have seen how other companies handled knowledge management and they have learned how initiatives failed or succeeded. Introducing new approaches has to break free from these experiences. It is a challenge, especially because Fiske and Tetlock (1997) showed that "when people face novel situations that raise the possibility of alternative implementation rules, debate will revolve around analogies to more familiar situations that people use as prototype implementations of the competing relational models."

4.3.1.2 Use of different models

Use of different models means that one participant assumes that the relationship is based on one model and the other assumes that it is based on another one. This can lead to very

painful personal experiences as well. Let's take the example of a consultant who has spent years with a given customer. She/he has built an excellent relationship with the customer, even on a personal level. After the project is finished, the customer sends a question to the consultant in an email, but the consultant does not respond, because the project is over; answering the email would be unpaid work. In this example the customer thought that there is a CS type of relationship between them, but the reaction of the consultant showed that it was "only" MP. Another example is discussing a topic by email among Intenzz employees. Participants in this email conversation assume that employees are happy to share their knowledge with their colleagues based on CS. If one consultant only answers questions when the manager is copied in, then that shows that this consultant is only interested in improving her/his image to the bosses and does not care that much about helping others. This example is a mismatch between CS and AR. Similarly, if a participant starts to think that what she/he can get from these knowledge exchanges is not enough and starts to keep track of how much she/he and others get, based on EM approach, then the CS relation is in danger.

Management of knowledge sharing patterns can have disastrous results when a model is forced into a relation. E.g., in an EM scenario, where participants share knowledge to teach each other topics, if money is introduced (based on MP), then the relationship among participants can collapse. Another example could be introducing the concept of authority in a CS scenario. The Dutch decision making process is often called the polder model. Decisions are discussed together and regardless of position in the organizational hierarchy, a bigger number of employees have a say and actively influence the decisions. Knowledge sharing is a consequence, since decisions require knowledge. If management tries to add more AR to this model, the results can be extremely negative. Intenzz management is aware of this, so that consideration plays a major role in managing knowledge sharing patterns.

Another interesting aspect of using different relational models is the difference between articulated motivation for knowledge sharing and actual knowledge sharing. Consultants are aware that knowledge sharing is important in the consulting business; therefore they do have the understanding that the deepest, most egalitarian knowledge sharing, communal sharing is necessary for the success of the company. E.g., a colleague who is well-known to skip knowledge sharing opportunities wrote: "I believe it is one of the most important

foundations (pillars) a company stands on. It should be a natural part of all employees (and the organizations' culture) that all have the desire to share knowledge with others. If the biggest part of the organization does not have that desire, the organization is doomed to fail. I think in general if an organization can manage to create a culture / organization in which everybody is highly satisfied, sharing knowledge (as part of the desire to help out each other) comes as a natural process." In terms of knowledge sharing, understanding is not enough. Real action is necessary. Also, management of knowledge sharing has to be on the level of facts and not stories. People may talk about CS and act according to MP. In this case, the CS narrative is irrelevant and decisions should take place based on actual behavior.

As discussed in chapter 2.1.5, cultural aspects are critical for Intenzz, because they can cause a mismatch in the use of the models as well. In some Asian cultures, AR may be more important than CS. In some sectors of contemporary American culture, many people apparently put MP ahead of EM and AR, etc. This plays a role in Intenzz as well, since some colleagues are not from the Netherlands and a great number of customers are not from the Netherlands either. Dutch culture is known to be individualistic and MP is widespread in this Anglo-Saxon business environment. Customer companies with Asian origins and their employees may be more used to EM or AR relationships in their daily personal and business life. When cultural contrast is present, people often encounter others who apply a different model to a familiar domain, or apply a familiar model differently. The EM way of working uses more favors, while Dutch are more used to MP, where conditions are black and white and expressed financially. The stress caused by such a mismatch of models is proportionate to the distance between the models. The distance is defined on the scale: CS>AR>EM>MP. (Fiske & Tetlock 1997)

4.3.1.3 Infrastructure is designed for another model

If infrastructure is designed for another model, it can result in mismatches. For example, if a consultant has built a strong personal relationship with a customer and is willing to share knowledge based on CS, this may prove impossible, because her/his management thinks in terms of MP and in order to maximize consultant billability, management may organize so much billable work for the consultant that she/he simply lacks the time to help others based

on CS. Finding an acceptable balance between the two, managing the knowledge sharing patterns is an important job for management to avoid such conflicts. Comparing the SAP Community Network with the Intenzz portal gives clear examples of differences in the infrastructure. While the SAP Community portal comes with a point system which supports MP and EM, the Intenzz portal lacks such features. The Intenzz portal is designed to work on CS basis, which also implies that employees who do not follow the CS model will not contribute to the Intenzz portal either.

4.3.2 Recommendations about managing the patterns

In certain situations certain patterns are more efficient. Inside Intenzz, i.e. focusing on internal knowledge sharing, Appendix 2 shows that the four models have their own strengths and weaknesses. CS is the preferred model, because any knowledge can be shared any time when needed without hidden motives. CS enables the most fluent flow of knowledge. In AR the participants aim at reaching a higher authority or reputation. Sharing is less spontaneous and knowledge is filtered, "negative" knowledge is withheld. As an example, AR can be very well used in decision making. Decisions can be easily and clearly made by people of authority. EM can function unproblematically as long as the balance between giving and receiving is present. If this equilibrium looses visibility or stability, the relation will stop. Furthermore, in cases of very diverse commodities, EM may run into difficulties, because the participants do not know how to compare give and take. When different types of benefits, e.g., various types of knowledge are being exchanged, MP is a real strength. Money or any other measurements and ratios can handle the fair exchange of these items. On the other hand, in MP knowledge sharing fully depends on the compensation; it does not create the open, sharing and personal relation such as CS.

Based on the analysis of the above mentioned models (see Appendix 2), considering the added value created in the various patterns, an ordered list of patterns can be made. In this list the first item describes the knowledge sharing pattern which delivers the highest quality in knowledge sharing and the last item is the lowest in quality. Table 18 shows this ordered list for patterns of maximum two models, .i.e. either a pure model or a combination of two models, where the first one is dominant (more than 50%) and the second one is weaker in the relationship. This list is valid if the patterns are not result of

disagreement such as one participant assumes that the relationship is based on one model and the other assumes that it is based on another one. The reasoning behind the evaluation is simple: CS has been shown to give the best results for internal knowledge sharing; therefore patterns based on CS are recommended. As mentioned before, the distance is defined on the scale CS>AR>EM>MP. (Fiske & Tetlock 1997), which means that on the other end of the spectrum, MP-based patterns are to be avoided. The patterns in-between give results which can be improved and this should be among the goals of knowledge management initiatives. The combinations are based on the above scale as well. The logical list would be the following: CS, CS+AR, CS+EM, CS+MP, AR, AR+EM, AR+MP, EM, EM+MP, MP. The ordered list in Table 18, however, differs from this logical list in one item: CS+MP is not in the fourth place, but at the very end of the list. This can be explained by the observation that these completely opposing models cannot be mixed well, and a pure MP is better than this mix. A pure MP has the benefit that it is pure, no conflicting motivations are blended.

Table 18: Ordered list of patterns (Source: own analysis)

Quality	Pattern	Evaluation
1	pure CS	Internal knowledge sharing is *recommended* based on these patterns.
2	CS+AR	
3	CS+EM	
4	pure AR	Internal knowledge sharing based on these patterns *needs improvement*.
5	AR+EM	
6	AR+MP	
7	pure EM	
8	EM+MP	
9	pure MP	Internal knowledge sharing based on these patterns is *to be avoided*.
10	CS+MP	

When reading Table 18, it is important to focus on the dominant patterns and not on insignificant details. For example, at Intenzz evening meetings, dinner is ordered, mostly pizzas, and the management pays for it. This is an MP relation and even small exaggeration of MP (e.g., making the meetings billable) could destroy the meetings. If meetings become billable, people will join for financial reasons and not with the intention of learning and sharing. The quality of the meetings would plunge.

According to Fiske, as participants get to know each other, they will move from MP towards CS. What it means for management, based on Table 18, is that patterns should be

identified and modified to enable more and better knowledge sharing inside the organization. It is not only desirable, but possible too, as it has been shown by Fiske and Tetlock (1997) that it is easier to move from MP to EM to AR to CS than the other way around. The frequency of interactions should be increased and it will lead to the participants' willingness to get into CS relations as well. The point collection system of the SAP Community Network (described above) is a good example of this. The motivation is based on MP (points), but it leads to increased use of the system which is the basis for building CS relationships as well. So we can expect SAP Community to move on this scale from MP to the direction of CS. Similarly, knowledge management practices at Intenzz aim at promoting CS too. Chapter 4.3.4 gives detailed examples.

4.3.3 KM guidelines

As the previous chapters described in detail, null relations should be minimized, the right knowledge sharing patter should be applied and the supporting infrastructure should be aligned to the pattern used. The following guidelines were created based on the above findings:

To avoid null relations:

- More formal and informal meetings should be held.

To use the most suitable pattern:

- The first item in Table 18 is pure CS; therefore Intenzz should try to create conditions for as much CS as possible. This facilitates moving from EM to CS.
- In order to enable CS and build SAP expertise inside Intenzz, Communities of Practice should be established.
- Similarly, knowledge sessions are very useful to build knowledge internally and improve the vision of Intenzz externally.
- Consulting is per definition MP-based and according to Table 18 the best combination including MP is AR+MP; therefore Intenzz should try to help consultants get AR benefits alongside MP to further strengthen the motivation for consulting.

To align the supporting infrastructure:

- The use of LinkedIn and such networks should be encouraged in order to locate experts and share knowledge across the boundaries of organizations.
- The Intenzz Portal should be redesigned to enable it to better support the communities.
- Further tooling, e.g. wiki, should be assessed to enable knowledge sharing.

4.3.4 KM practices at Intenzz based on the management of the patterns

Intenzz has made several modifications to its knowledge management practices based on this research. The new knowledge management concept is summarized in the PowerPoint slides at Appendix 9. The goal of describing all these modifications is not to create guidelines which can be generalized without further research, but to demonstrate the practical value of Fiske's theory. The fact that Intenzz could make very good use of the Relational Models Theory and management of the patterns, indicates that this approach is useful, in other words, the theory can be applied in real life challenges.

4.3.4.1 Communities of Practice

Intenzz started to encourage all kinds of meetings among employees. The meeting can range from formal company meetings to informal barbeques. Any kind of meeting serves the purpose of getting to know each other, building personal relationships, and trusting each other so that CS can commence. Communal Sharing can occur only among certain people who have a social bond. If an outsider is added, e.g., a new colleague, then it is certain that CS will not be established for a long time. In Intenzz, new colleagues start mostly with EM and slowly, in months or years reach CS.

Based on the lessons learned from the research, in order to adopt CS faster, Intenzz NetWeaver Services set up the Communities of Practice (CoP's) listed in Table 19. For a knowledge-intensive, agile consulting firm such as Intenzz, tacit knowledge is crucial, because codified knowledge is usually not enough to make a difference in the market. (See

chapter 2.1.1.3 about the types of knowledge.) For this reason, face-to-face, decentralized knowledge sharing should be supported by management. The CoP concept refers to the process of social learning that occurs when people who have a common interest in some subject or problem collaborate over an extended period to share ideas, find solutions, and build innovations. The main features of the Intenzz CoP's are as follows:

- Internally motivated without external driver. This means that consultants take part because they are really interested and they very clearly see personal benefit in devoting time and effort to the given topics. There is no need for a manager to push this initiative. The development of such strong networks of likeminded individuals produces an environment typified by high levels of trust, mutual respect and even shared behavioral norms.
- Developing social capital. This AR factor is also relevant. Participation in CoP's allows consultants to demonstrate their expertise and gain reputation and status inside the team.
- Nurturing new knowledge. Quite obviously, a key feature of CoP's is their ability to generate new knowledge.
- Stimulating innovation. Since Intenzz employees are elite in their profession, knowledge sharing among them can lead to very innovative ideas. One example is the Exponential Service Oriented Architecture methodology developed by the ESOA Roadmap CoP. This methodology is unique in the market and it constitutes the main vision of Intenzz.
- Sharing existing tacit knowledge. Sharing codified knowledge can be facilitated in various ways, including by portal. Tacit knowledge is more difficult to share, but the CoP's attempt to reach this goal as well.
- Part of organizational development. As CoP's represent regular meetings among colleagues, most social life within Intenzz is related to CoP's. The way CoP's get started, develop, and disband reflects major dynamics in the organization. CoP's support team building by creation of understanding, trust, team spirit, and team cohesion.

Table 19: CoP's (Source: own data)

CoP	Short Description
eSOA Roadmap	Create methodology/service to present/explain Enterprise Service Oriented Architecture, cover SOA governance
BPM/ccBPM	Learn existing Business Process Management tools/technologies, follow the development in this area (e.g., the Galaxy project or cross-component BPM)
Enterprise Services	Service provisioning, consumption, Enterprise Service bundles, web service security, business objects, etc.
Visual Composer	SAP Visual Composer is a tool that is designed to enable business analysts to easily create applications that can be used in the SAP NetWeaver Enterprise Portal.
Federated Portal Network	A federated portal network allows organizations with distributed portal installations, both SAP and non-SAP, to provide a single portal access point per user to portal information, services, and applications distributed on portals throughout the entire organizational network.

In order to make CoP's successful, it is necessary to let them organize themselves voluntarily. Each year all three teams (Process Integration (XI), Enterprise Portal (EP), and Business Intelligence (BI)) inside Intenzz hold an important meeting where they decide on the so-called focus areas. The methodology for deciding on these focus areas is as follows:

1. List all the IT practices and scenarios defined by SAP
2. Identify the IT practices and scenarios and variants relevant for the team
3. Rate the expected market demand for each variant
4. Rate the level of existing knowledge in each variant within the team
5. Rate the level of interest (ambitions) for each variant within the team
6. Make a decision for each variant. Possible options:
    - F (focus area)
    - S (service offering)
    - H (knowledge missing, to be hired)
    - I (ignore, i.e., the given variant is not expected to play an important role in coming year)

This means that the teams make a conscious forecast each year about various trends in the SAP market and allocate resources accordingly. Each team member goes through this process and the results are aggregated to reach a final decision. If there is enough knowledge available internally, a service offering is written and the sales team of Intenzz

strives to win projects in this area. If the knowledge is completely missing, it makes sense to hire employees with that knowledge. It would otherwise require much effort to internally develop this knowledge. If the topic is not rated highly by the team members, then it can be ignored for the coming year. Otherwise a topic is worth the effort and will become a focus area. This logic is demonstrated in Figure 16:

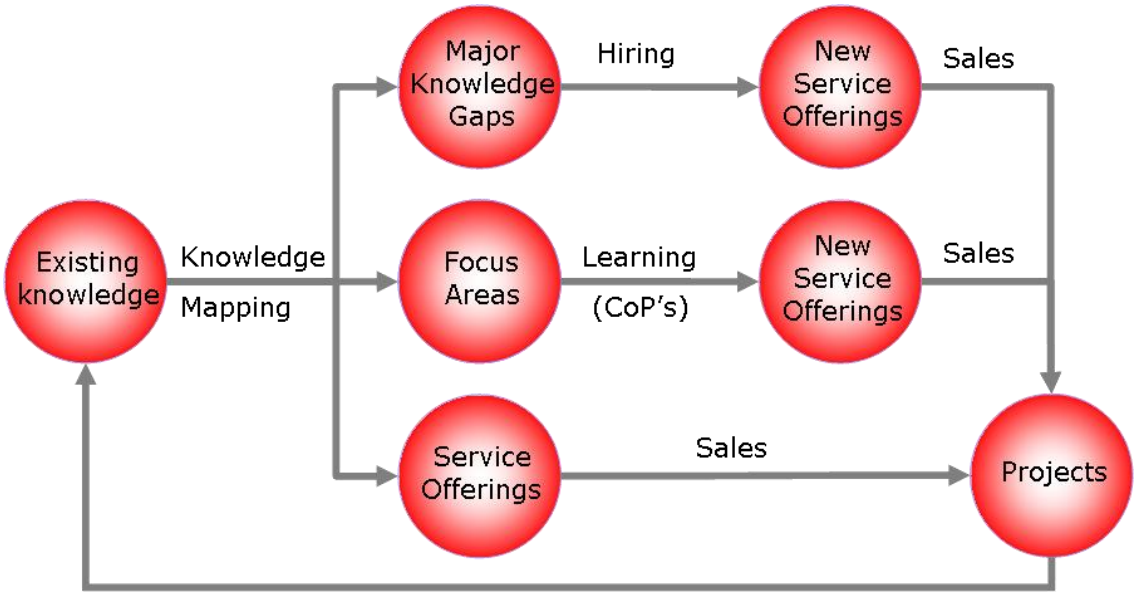


Figure 16: Knowledge development at Intenzz (Source: own figure)

Participants were assigned to the CoP's at two levels: fixed members, who promise to actively participate and contributing members, who sometimes contribute without any fixed commitment. The list of the CoP's and their membership list have been published in the Intenzz portal. CoP membership can cross team boundaries. This approach helps to minimize null relations between employees of NetWeaver Services and Business Intelligence Services. It also helps bypass hierarchies within Intenzz (AR model) and enable knowledge sharing based on CS. Figure 17 shows how certain CoP's can be specific to a business unit, can cross business units, or be relevant for all of Intenzz.

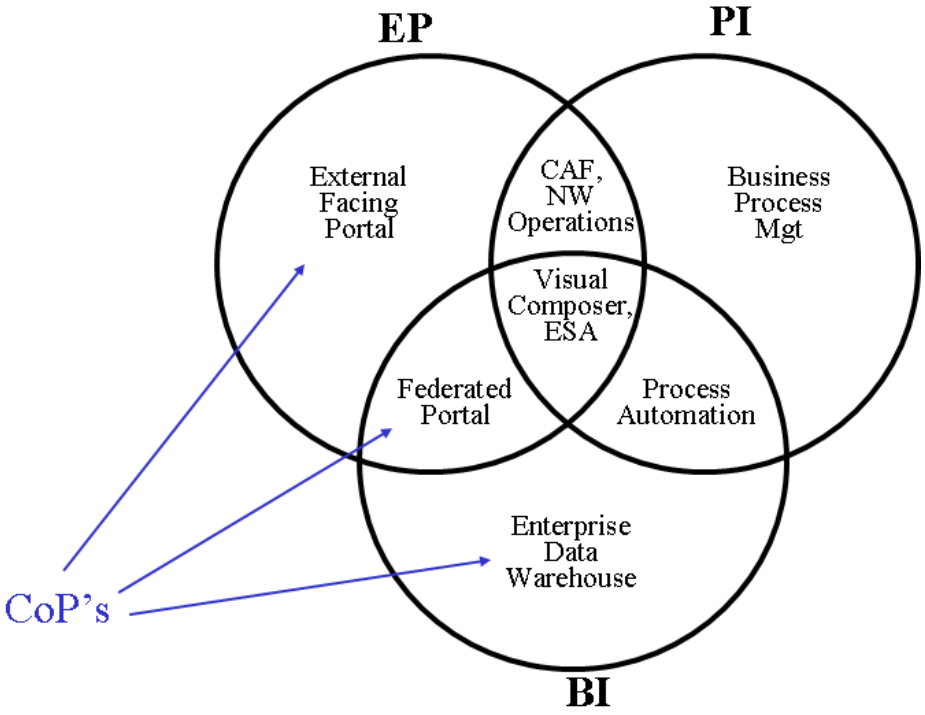


Figure 17: CoP's and business units (Source: own figure)

The fact that CoP's go beyond team boundaries has multiple benefits for the organization since teams (such as Business Intelligence, Process Integration and Portal teams) have serious limitations (McDermott 1999):

- Teams can become silos. Good teams have some special bond based on values, focus, physical proximity, etc. This can lead to a "we against them" thinking when dealing with other teams. The result can be that knowledge sharing among teams is limited and none of the teams are really interested in it. A typical symptom is that people reinvent ideas which have already been developed by other teams; thus the same work is wastefully repeated in the organization.
- Teams can get isolated. If there is no structural connection between teams, they can develop into a completely separate organizational unit, losing on the synergy effect.
- Isolation can lead to team myopia. Once a team reaches a high level of isolation, the team members can get so closed-minded that they are unwilling to listen to ideas coming from outside the team. ("not invented here" syndrome) This is especially counterproductive given that ideas from outside can be very efficient in fertilizing the given team by introducing new perspectives.
- Teams can neglect longer-term knowledge developments. Teams are usually arranged around existing business activities. In order to develop new competencies,

knowledge for the future, sometimes it is necessary to distance from the existing team structure.

McDermott (1999) recommends “double-knit” organizational structure to avoid the above pitfalls. Double-knit structure is based on teams for existing business activity and CoP’s for innovation and knowledge development. Figure 17 shows the realization of this approach inside Intenzz. The double-knit organizational form is not the same as a matrix. While the double-knit organization has a formal, fixed and centrally organized dimension (teams) and an informal, flexible and self-organizing one (CoP’s), the matrix structure consists of two formal dimensions (e.g., functional and project).

An important aspect to keep in mind when creating a structure in which people participate in several CoP’s is that participants may get very stressed when they feel there is a conflict between two relationships of the same type. Imagine two communities requiring effort; in case of conflict due to time limitations, stress can occur. If no stress at all is present, we may question if the relationship is CS at all.

Intenzz introduced the following guidelines regarding CoP’s:

- Agree on topics and chose members voluntarily! (periodically)
- Let the members agree on their preferred way of communication (personal meetings/chat/email/phone calls)
- Create a folder in the Intenzz portal
- Use resources creatively (competition, SAP, conferences, etc.)
- Create a knowledge map of the topics
- Plan how to obtain knowledge e.g., align training sessions
- Establish the goal(s) and set milestones in a written form
- Present deliverables at milestones to the CoP and Intenzz (preferably a scenario in the demo system)
- Provide input for recruiting
- Set up a weekly routine to read SAP materials
- Share resources and ideas
- Let the customers know about the CoP’s

The role of the partners was defined as follows:

- Agree on topics and assign members voluntarily! (periodically)
- Guide with knowledge map creation
- Review goals and plans
- Support and motivate
- Feed back on deliverables
- Connect CoP's together
- Keep the CoP's aligned with Intenzz directions

In the first meeting in the life of a CoP, the members are expected to together write a document covering the following points:

- List of members
- Definition of the CoP: what knowledge areas are included and which ones are excluded
- Goal of the CoP: what will the CoP achieve
- Approach: how the goal will be achieved
- Ways of working: how the CoP members will work together (meetings in the office, off-site readings, etc.)
- Document management: how the Intenzz portal will be used

Nahapiet & Ghoshal (1998) showed that the CoP environment is ideal for knowledge sharing. There has been no measurement inside Intenzz about the level of knowledge or the consequent increase in the level of knowledge, but management and employees think that their success in the market is partially due to the advanced knowledge sharing in CoP's. The demand in the market for SAP consultants is extremely high, which means that the opportunity cost of each hour spent on knowledge sharing is very high. Despite this economic factor (MP), CoP's are very active, so CS dominates over MP.

4.3.4.2 Knowledge sessions

Based on this research, Intenzz has increased its activity in knowledge sessions. Even though all types of sessions became more regular, knowledge sessions with customers got

significantly more prevalent. By Summer, 2008, there were two sessions each week on average. These sessions help knowledge sharing in various ways. First, preparation increases the need for internal knowledge sharing. The number of null relations decreases, the trust among employees is growing, and the CS model is spreading. On the other hand, these sessions contribute greatly to the reputation of the Intenzz consultants who conduct the sessions (AR) and even help move customer relationships in a CS direction. Of course, the customer relationship will stay predominantly MP-based, but introducing CS elements creates unexpected value and especially positive feelings towards Intenzz. These sessions have become hugely successful and led to a number of new projects. An unplanned, extremely positive side-effect of these knowledge sessions has been that large, very advanced (in terms of SAP system maturity) customers have asked Intenzz to explain its vision in various SAP areas. This has required lots of preparation within Intenzz, intensive collaboration and real innovative thinking in the CoP's. Without the knowledge sharing mechanisms in CoP's the same quality would have been extremely difficult to reach.

4.3.4.3 Information technology

Based on the guidelines, a small team was formed to work out recommendation for all of Intenzz about the use of LinkedIn, an Internet-based professional, business-oriented social networking site of more than 100 million users around the world (Weiner 2011). Based on these recommendations, consultants became conscious and advanced users; they know that this network allows them to keep in touch with consultants of other companies, customers, and other business relations.

The Intenzz portal (based on LifeRay Portal 5.0), the intranet portal of Intenzz, has also been reviewed in the light of the findings of this research. As mentioned before, the focus of Intenzz is on tacit knowledge and building large repositories for codified knowledge is something Intenzz very consciously tries to avoid. The SAP Community Network is an existing huge repository; Intenzz sees no reason to internally reinvent the wheel. (Note that at this point the two cases of this research "meet".) Nevertheless, a portal is needed to share codified knowledge, which is the basis for high-end tacit knowledge sharing. Since knowledge sharing within Intenzz takes place mostly in CoP's, i.e., in CS model mixed with some AR and EM, there is no need for any point or reward system in the portal. Even

usage of the portal has to be voluntary and should not be measured as part of an employee evaluation. Folder structures and discussion forums have been set up to enable knowledge storing. Search functionality, even inside documents, has been configured to allow quick access to information. Of course, a portal has its strengths in codified knowledge, while tacit knowledge sharing prevails in the domain of CoP meetings. (See chapter 2.1.4 about the relationship of information technology and knowledge management in the area of portals.) Yet even the portal can support tacit knowledge sharing via its Who is Who functionality. This allows consultants to find contact details of the other consultants and directly question them.

To enable further cooperation in the Process Integration team, a wiki has been set up. This web-based co-editing environment allows the team members to create content while they are not in the same place at the same time. It is not possible, or at least not easy, to track who contributed which text (which would be useful for AR), but that is in line with the intention to apply the CS model as much as possible in this team.

File sharing in project teams has been facilitated by Dropbox, a file synchronization service. This tool makes sure that the files used in the project team get updated on each person's PC and the users even get real-time notification about changes. This software speeds up and simplifies access to information, which motivates project team members to share.

Since the foundation of Intenzz, it has been in the center of discussions how to improve the communication within the company. Email has been widely used, but the people who shared a lot of information got disappointed about the fact that most colleagues did not react on their information sharing emails. This disappointment led them to share less knowledge. This clearly indicates that while there is CS in teams and CoPs, it is not the norm company-wide. In order to tackle this issue, Yammer has been introduced for non-urgent team communication. Yammer is an enterprise social networking platform; simply said, Twitter within the company, which can be accessed via web, desktop and even some smartphones. The level of interactions increased appreciably, which resulted in a significant rise in internal communication and knowledge sharing based on the EM model.

4.4 Comparison with the findings of the research project "Coordination and Knowledge Transfer within Teams"

Suzanne Snoeren from the Rotterdam School of Management, Erasmus University Rotterdam conducted a research called "Coordination and Knowledge Transfer within Teams" in 44 teams across various organizations, among them the five teams of Intenzz (as shown in Table 20), in July 2009. The 44 teams came from various sectors such as pharmaceutical, insurance/banking, consulting, development/production, and government sector. The teams themselves were of various types including process improvement teams, HR teams, IT teams, administration teams, pension teams, insurances teams, mortgage teams, management teams, service teams, consulting teams, marketing teams, financial teams, real estate teams, communication teams, R&D teams, and sales teams. (Snoeren 2009) This research was done completely independently from the research discussed in this dissertation; therefore it offers an excellent opportunity to compare the findings.

Table 20: Intenzz teams (Source: own data)

Team number	Name of the team
1	Business Intelligence Services team
2	NetWeaver Services team
3	Business Process Services team
4	Development Services team
5	Sales team

Snoeren focused her research on teams what she defined as "a group of individuals who are interdependent because of the tasks they perform, who share responsibility for outcomes, who perform tasks that affect others and who see themselves and who are seen by others as a social entity embedded in one or more larger social systems". (Snoeren 2009) Teams were analyzed in four aspects: task interdependence (the team members depend on each other at work), transactive memory (the team members know who knows what in the team), team coordination (management of the dependencies among team members), and team performance (the result what the team creates). Team coordination was split into explicit and implicit coordination. Explicit coordination can be realized via planning (e.g. schedules), communication (e.g. oral or written), and team reflexivity (e.g. discussing processes or evaluations). Implicit coordination can be provided by anticipation (monitoring other team members and if necessary, proactively offering information or

help) and dynamic adjustment (adapting one's behavior to the expected actions of others). (Snoeren 2009)

The results of this research are summarized in Table 21. The last column shows the mean of all the teams which were analyzed, i.e. teams outside Intenzz as well.

Table 21: Intenzz team scores and mean of all participating teams (Source: Snoeren 2009)

Variable	**Team 1**	**Team 2**	**Team 3**	**Team 4**	**Team 5**	**Mean all teams (N=44)**
Transactive Memory	3.8	3.8	3.9	4.5	3.6	3.6
Task Interdependence	3.0	3.3	3.8	4.1	2.9	3.3
Coordination via Planning	2.8	3.1	2.8	4.3	3.5	3.5
Coordination via Communication	3.2	3.9	3.3	4.5	4.5	3.2
Reflexivity: Discussing Processes	2.8	3.3	3.3	4.5	3.6	3.1
Reflexivity: Evaluation/Learning	3.4	3.6	3.7	4.5	3.8	3.5
Dynamic Adjustment	2.9	3.2	3.2	4.2	3.8	3.4
Anticipation	3.4	3.8	3.7	4.3	4.0	3.6
Team Performance	3.3	4.6	3.4	4.0	3.7	3.7

The values, which range from 1 to 5 where 5 is the best, are calculated from a web-based survey done among all Intenzz employees. Interesting to note that while the team performance was based on the manager's rating of the performance of the team, all the rest was based on employee ratings. It is easy to see in Table 21 that Team 1 has the lowest scores from the five teams; not only the manager rated the team performance the lowest, but the employees rated all the aspects of team coordination and knowledge transfer the lowest too. Team 1 was well-known inside Intenzz to have less informal meetings and lack behind in terms of CoPs. For example, all the CoPs listed in Table 19 were initiated by other teams and members of Team 1 only participated. Another indicator is that Team 1 and Team 2 were of similar size, but while Team 1 had only 91 documents in the Liferay portal, Team 2 had 212 documents (own data).

Six recommendations can be extracted from Chapter 4 (Results) and 5 (Practical implications) of Snoeren's research paper (2009). These can be compared to the KM guidelines created in the current research (as listed in Chapter 4.3.3). The following paragraphs contain this comparison.

Recommendation 1: "Team 1 scores below average on anticipation within the team." and "Team 1, 2 and 3 score below average on dynamic adjustment." When analyzing this recommendation, it is important to consider that according to Khan & Lodhi & Makk (2010), sharedness accuracy is a prerequisite for anticipation. Sharedness accuracy describes how precise knowledge the team members have about the specific situation and about each others. Longevity, e.g. through the use of habitual routines (Gersick & Hackman 1990), knowledge diversity, trust and group efficacy contribute to sharedness accuracy. (Langan-Fox & Anglim & Wilson 2004, Levesque & Wilson & Wholey 2001, Rico et al. 2008) The component of longevity is in line with the guideline of the current research about having more formal and informal meetings among employees. Knowledge diversity is in line with the guideline promoting communities of practice. Trust is best achieved in CS, which is among the guidelines as well.

Recommendation 2: "Team 1 scores below average on reflexivity: discussing processes, which means that the members could improve their reflexive behaviour, for example, by reflecting the way things are usually done in the team and reflecting on the team objectives." This recommendation is in line with the KM guidelines promoting more meetings among employees and creating conditions for as much CS as possible. (De Dreu 2007) Open discussion in the model of CS offers the best ground for open reflection (Shih 2008, Jehn 1995, Pelled 1996), higher frequency in communication alone is not enough. (Foo et al. 2006)

Recommendation 3: "Team 1, 2, and 3 could improve their coordination via planning." The author does not see a direct link between this recommendation and the KM guidelines created in the current research. It is understandable, because the guidelines of this research are not specific to organizational setting, while Snoeren's recommendations are targeted to teams. Teams require more initial

knowledge about collective object of activity and division of labor than less formal groups such as an informal networks or CoP's. (Wenger 1998) Similarly, Ciborra & Patriotta (1996) point out too that in less formal organizational settings the lack of rules can be compensated by a strong shared knowledge, core values, and attitudes.

Recommendation 4: "It is important for every team to develop a transactive memory system among the team members. In order to do so, the team members must know about each other's knowledge and expertise and make us of it. This can be accomplished by training the team members in sharing knowledge, expertise and informing each other. Regular team meetings are a useful opportunity to pay attention to this. Another idea would be to arrange special team meetings, for example, every two months to spend time developing the transactive memory system among the team members." This recommendation is in line with the guideline to organize more knowledge sessions, because preparing such events offers a lot of opportunities for cooperation and getting to know each other's expertise. As the guidelines mentioned it, working in CoP's and the use of the internal portal can serve the same purpose. The use of LinkedIn and such networks can help to realize this recommendation too, but LinkedIn is not limited to internal deployment, actually it is even better suited for knowledge sharing across the boundaries of the organization. Yammer, on the other hand, supports daily contact among geographically distant consultants; therefore it is perfectly suited for developing transactive memory.

Recommendation 5: "The manager should support and encourage the sharing of knowledge and expertise among the team members. Teams make use of a mix of coordination mechanisms to achieve the team tasks. It is important for teams not only to use team coordination the way they are used to but also to improve it." This recommendation is not very explicit about how to improve team coordination and knowledge sharing. The KM guidelines are more specific in suggesting to create conditions for as much CS as possible to facilitate moving from EM to CS.

Recommendation 6: "Teams should spend time on improving team coordination. This should be an issue in team meetings. During team meetings the coordination processes within the team should be evaluated and based on this evaluation

improved. The team manager has a facilitating and monitoring role in this." This is a general recommendation covering points which have already been discussed in the previous recommendations.

Looking at these recommendations, it can be concluded that they are in line with the KM guidelines created in the current research. Besides the large overlap, there are differences as well. The recommendations cover team coordination beyond "just" knowledge sharing. On the other hand, the KM guidelines cover knowledge sharing with the customers too ("Intenzz should try to help consultants get AR benefits alongside MP to further strengthen the motivation for consulting" in Chapter 4.3.3.), not "just" internal relationships.

The differences are understandable considering that the two research studies had different goals. On the other hand, the large overlap between the recommendations and the guidelines indicate that the guidelines created in this research are indeed valid and serve the benefit of the organization.

4.5 Summary of the new scientific results

A PhD dissertation is required to create new scientific results. The research conducted in this PhD project, however, goes beyond scientific results; it even delivered practical results. The new scientific results of this research can be organized in the following three groups:

Research method:

1. This research introduces the so-called knowledge sharing patterns as extensions of the original Relational Models Theory. Understanding these patterns enables knowledge managers to define practical guidelines to encourage knowledge sharing.
2. Not enough attention has been paid to the motivational aspects of knowledge sharing, and even the various research papers in this area come to very different and confusing conclusions. Proving that Fiske's theory is applicable to describe all knowledge sharing in Intenzz and the SAP Community will, hopefully, draw more attention to this approach and encourage further studies.

3. This exploratory research laid the foundations and developed the tentative propositions which can be tested in another subsequent explanatory research.
4. This dissertation "walks the talk", because it not only discusses knowledge sharing, but supports it as well. It is written in English which is the basis nowadays for an international knowledge sharing.

Research results:

1. It follows the line of research started by Boer & Berends (2003) and proves the applicability of Fiske's (1991) Relational Models Theory to a consulting firm (Intenzz SAP Consulting Group) and an online community (SAP Community Network).
2. The research demonstrates that all knowledge sharing within Intenzz or in the SAP Community can be described by the four models or the patterns of the four models.
3. The results show that the four models do not operate in their pure theoretical form, but intermix in patterns. This means that knowledge managers should focus on these patterns and not on the pure models in their practice.
4. The results show which models were more or less relevant models in the various knowledge sharing processes.
5. Knowledge processes were derived from business processes in order to support the design of knowledge infrastructure.

Practical results:

1. An ordered list of patterns was created to formulate recommendations to improve knowledge sharing.
2. Pragmatic guidelines could be derived from the theory and the management of Intenzz was able to encourage knowledge sharing based on the results. This demonstrates the practical value of Fiske's theory.
3. More formal and informal meetings were held to minimize null relations.
4. Communities of Practice were enforced to foster more CS-based sharing.
5. More knowledge sessions were conducted to strengthen AR models.
6. Various IT solutions were introduced to support knowledge sharing:
    - the further use of Internet-based communities, such as LinkedIn, was encouraged
    - the Intenzz portal has been reviewed and fine-tuned to support the CoP's

- Wiki and Dropbox were adopted for specific knowledge sharing purposes
- Yammer was introduced to improve company-wide communication

7. Although hard to quantify, the author is convinced that the research, the constant discussion about knowledge sharing and various knowledge sharing techniques, increased awareness in the organization, such that Intenzz became more advanced in its knowledge management approach in areas which were not even part of the scope of this research.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The first goal (G1) of this project was to prove the validity of Fiske's theory for a consulting firm and an online community. In the first case study about Intenzz SAP Consulting Group both the online survey and the interviews delivered results that supported the hypothesis (H1) that the four models of Fiske's theory (1991, 1992), Communal Sharing, Authority Ranking, Equality Matching and Market Pricing can describe all knowledge sharing inside an organization. Table 14 shows the distribution of the four models inside Intenzz. Summing the percentages for each business process gives 100%, which means that the four models are complete.

Table 14: Relational models in the business processes (Source: own analysis)

Business Process ID	CS	AR	EM	MP
BP01	21	39	18	21
BP02	43	14	39	5
BP03	52	5	14	29
BP04	38	24	38	0
BP05	58	19	23	0
BP06	0	62	0	38
BP07	33	29	38	0
BP08	14	57	29	0
BP09	0	48	14	38
BP10	52	29	19	0
BP11	57	14	29	0
BP12	63	38	0	0

In the second case study about SAP Community Network the qualitative methods showed that the four models are again capable of describing knowledge sharing in this online community (H2). Based on these results, hypothesis H1 and H2 are accepted.

The second goal (G2) of this research was to investigate the knowledge sharing practices within Intenzz SAP Consulting Group in an exploratory approach. This was achieved by the online survey, interviews with employees and managers, by business process modeling, and modeling of the related knowledge processes. These methodologies improved

understanding of the knowledge sharing patterns for each of the 12 business processes analyzed inside Intenzz. All these findings were the foundation to reach the third goal (G3).

The third hypothesis (H3) states that since Intenzz SAP Consulting Group is a knowledge-intensive consulting company, the Community Sharing model dominates in its internal knowledge sharing practices. More precisely formulated, more than 50% of the motivation in the internal processes follows the Communal Sharing model. Table 16 shows that the average percentage for CS is 52%; therefore H3 is accepted.

Table 16: Internal business processes (Source: own analysis)

Business Process ID	CS	AR	EM	MP
BP02	43	14	39	5
BP03	50	0	20	30
BP04	40	20	40	0
BP05	58	19	23	0
BP10	50	30	20	0
BP11	60	20	20	0
BP12	63	38	0	0
Average	52	20	23	5

The third goal (G3) was to create guidelines for managing the knowledge sharing patterns within Intenzz SAP Consulting Group. The findings reached as part of G2 helped to create an ordered list of knowledge sharing patterns and identify areas for improvement in the knowledge management practices of Intenzz. This included, for instance, the organization of communities of practice and reorganization of the intranet portal for better management of knowledge sharing patterns. Consequently, G3 has been reached.

To sum up, all four and no more than four models could be found in both case studies. This is the most important research observation. Once this is settled, there are great possibilities to analyze the patterns of these four models and improve them. Some researchers (e.g. Yoo & Ginzberg 2003) have already concluded that global knowledge management processes in large organizations are not optimal; hence it is more efficient to understand the strategic roles of the local units and consider these when designing knowledge management support tools and practices. Given the above findings about knowledge sharing patterns, this is obvious. Patterns exist at a micro level; therefore KM has to consider the micro level.

Fiske's relational model is designed to describe social behavior. It does not cover asocial behavior. Consequently, even asocial knowledge sharing like giving false information intentionally is outside the scope of this theory. Therefore conclusions can only be drawn for social interactions. This is a limitation; malicious and openly criminal behavior is outside the scope of this study. Of course, such behavior does not even belong to the domain of knowledge management.

5.2 Recommendations

This research shows that Fiske's theory can be applied to a consulting firm and an online community. It would be recommended for a follow-up research to take it further, investigate a representative sample of consulting firms and online communities to prove the validity of Fiske's theory to all consulting firms and online communities. This research has developed some guidelines that were practical enough for the management of Intenzz to increase knowledge sharing in the organization. This research, on the other hand, only demonstrated some examples; it did not aim to create comprehensive instructions for knowledge managers. It is recommended that future researchers continue with this approach and develop further guidelines to exploit the theory's full potential.

Fiske's theory (1991) is a powerful tool for sure. Haslam (2004) reviewed all the research using the Relational Models Theory and came to this conclusion: "The review of the research literature on the RMs presents a picture of growth and diversity. RMs theory has generated or seeded a wide variety of empirical studies and conceptual explorations, and these have, in turn, given a generally positive report on its standing as a theory. It seems reasonable to expect that its second decade sees further development and consolidation." (Haslam 2004, p. 54.)

Another area for future research where knowledge sharing may operate differently from other areas is the open source movement. Explaining the incentives of individuals who take part in the open source movement is an interesting challenge for knowledge management researchers.

Open source is a development method for software that harnesses the power of distributed peer review and transparency of process. The promise of open source is better quality, higher reliability, more flexibility, lower cost, and an end to predatory vendor lock-in. Open source software offers practical access to a product's source code. The rise of open source culture in the 20th century resulted in a growing tension between creative, collaborative and open practices and the traditional practices based on copyrights and restrictive intellectual property laws.

From the point of view of economic theory, motivation can originate from gaining a reputation among one's peers, signaling quality of human capital or learning (Lerner & Tirole 2002, Dalle & David 2003, Chaudhary 2003) Filling an unmet market (Green 1999) is another important economic incentive. So far, the motivational aspects of the open source movement have not been analyzed based on Fiske's theory. This is a huge opportunity to show the applicability of the theory on one side, and to better understand this movement on the other side.

As mentioned in the Introduction, KM was treated as a new weapon in the arsenal of information technology in the 1990's. This research, however, consciously focused on the motivational aspects of knowledge sharing and not on the IT enabling. On the other hand, some of today's ICT trends such as Cloud Computing, Mobility, Social Communications and Collaboration, Web and Enterprise 2.0, Social Analytics, Storage Class Memory, etc. (Gartner 2010, Deen 2010) change the way knowledge can be managed. The impact of these technologies on knowledge sharing patterns is an exciting research area to be explored.

Last, but not least, let this chapter conclude with another type of recommendation. Since this PhD project was partially coached by the University of West Hungary and the Eindhoven University of Technology in the Netherlands, the author hopes that this work will encourage cross-fertilization between these two universities for the benefit of both and could bring beneficial consequences beyond the scope of this project in the future.

6 SUMMARY

In today's knowledge economy, knowledge plays a pivotal role in the success of business organizations. If members of an organization share their knowledge with each other, the organization is able to be more innovative and eventually more competitive in the market. Knowledge managers have always paid a lot of attention to knowledge sharing, but never enough to the motivational aspects of it, including questions such as "Why do people share information with co-workers or why do they not?" or "What motivates a person to give up personal knowledge to someone else?" Until the motivation is clearly understood, knowledge management practices cannot be efficiently improved. There are many examples supporting this point: some organizations have invested significant amounts in KM solutions only to see their initiatives falter. If the motivation for knowledge sharing is not clear (and clearly managed), then employees do not simply start contributing.

Fiske's (1991, 1992) Relational Models Theory, which is the centerpiece of this dissertation, was not originally invented to describe knowledge sharing, but generally, human relationships. Fiske (2004) states that the "Relational models theory is simple: People relate to each other in just four ways. Interaction can be structured with respect to (1) what people have in common, (2) ordered differences, (3) additive imbalances, or (4) ratios. When people focus on what they have in common, they are using a model we call Communal Sharing. When people construct some aspect of an interaction in terms of ordered differences, the model is Authority Ranking. When people attend to additive imbalances, they are framing the interactions in terms of the Equality Matching model. When they coordinate their actions according to proportions or rates, the model is Market Pricing."

Even though this theory was invented to describe human relations in general, few researchers hypothesized that it could also be applied to knowledge sharing since knowledge sharing is a human relation after all. There have already been efforts to show the validity of Fiske's theory to knowledge management in a research and a government organization, but not in a consulting company and an online community. This interdisciplinary research bridged precisely this gap.

In order to reach this goal, the dissertation provided a brief introduction to knowledge and its various definitions and explained the difference between data, information, and knowledge. The basic types of knowledge such as a priori vs. a posteriori and tacit vs. codified were discussed. Regarding the nature of knowledge, most attention was paid to its economic nature, including how knowledge behaves as a product, as a quasi-public good or as an asset. The value of knowledge and its role in the economy (regarding production, innovation, intellectual property rights, etc.) were analyzed. This, to some extent, theoretical chapter laid the foundations for the rest of the discussions in the dissertation, because knowledge management cannot be discussed scientifically without an understanding of the value, role, types and nature of knowledge.

This dissertation presented various definitions of knowledge management and described the main knowledge management processes, especially knowledge sharing. In this respect, the relationship of knowledge management with culture and information technology has been analyzed. Beyond this general introduction, the author delved deeply into the existing theories of the motivational aspects of knowledge management and Fiske's theory was discussed in detail.

The research project covered two case studies. One, about Intenzz SAP Consulting Group, showed that knowledge sharing can be fully described by the four relational models defined by Fiske. The methodology of this case study included a mix of qualitative and quantitative methods: first, an online survey was conducted among the employees of Intenzz. This helped to identify the most common knowledge sharing scenarios inside Intenzz and gather qualitative data about the usage of the four relational models. Second, management was interviewed to review the list of business processes in the online survey. This resulted in a longer list of processes. Third, based on the output of the online survey and interviews with management, business process models and knowledge process models, based on the former, were created. These knowledge process models show what knowledge processes are present and what kind of knowledge sharing takes place within Intenzz. Finally, interviews with the employees were conducted to analyze all the scenarios that were not covered in the online survey. The business and knowledge modeling tasks were performed using the growing BPMN standard, which is becoming widely accepted for process modeling.

In the first case study 12 business processes were analyzed and for each process the related knowledge process was mapped. The knowledge sharing steps were identified; it was verified that they can be described by a combination of the four models. Further, it was established in the first case study that 52%, i.e., the majority of the motivation in the internal processes within Intenzz follows the Communal Sharing model.

The second case study, about SAP Community Network, used qualitative descriptive methods and concluded the same: the four models are applicable and can fully describe the knowledge sharing inside the Network.

In any given situation the four models can be present in combinations; participants may interact along different models in different situations, even in one given situation. This mix of models can be described as knowledge sharing patterns. These patterns were analyzed in both case studies and in case of Intenzz a dominance of Communal Sharing was proved.

This exploratory methodology and the findings resulted in the creation of an ordered list of knowledge sharing patterns and the formulation of some guidelines that helped Intenzz implement improvements in its knowledge sharing practices. This tangible benefit demonstrates the value of introducing Fiske's theory to knowledge sharing. The four models and the knowledge sharing patterns are capable of providing an approach which is scientifically valuable and at the same time, as any good theory, can be used in practice as well. Furthermore, this exploratory research laid the foundations and developed the tentative propositions which can be tested in another subsequent explanatory research.

As pointed out in the recommendations, a new example of knowledge sharing has emerged in recent years in the form of the open source movement. The author assumes that the four models can describe knowledge sharing in this new environment as well, but as this has not been covered in this dissertation, it can be the goal of future research.

7 ÖSSZEFOGLALÁS

Korunk tudásgazdaságában a gazdasági szervezetek sikerében elsődleges fontosságú szerepet játszik a tudás. Ha a szervezet tagjai megosztják egymással a tudásukat a szervezet innovatívabbá és végül versenyképesebbé válik. A tudásmenedzserek mindig is sok figyelmet szenteltek a tudásmegosztásnak, de a motivációval kapcsolatos kérdéseknek - mint pl. „Az emberek miért vagy miért nem osztják meg tudásukat a kollegáikkal?" vagy „Mi motivál valakit arra, hogy személyes tudását valaki másnak átadja?" - nem eleget. Addig, amíg a motiváció érthetővé válik, a tudásmenedzsment gyakorlatok hatékony fejlesztése nem megoldható. Ezt számos példa alátámasztja: néhány szervezet jelentős összegeket fektetett be tudásmenedzsment rendszerekbe és a tudáscsere mégse indult be. Ha a tudásmegosztás motivációi nem világosak (és világosan menedzseltek) az alkalmazottak nem kezdenek spontán tudáscserébe.

Fiske (1991, 1992) Kapcsolati Modellek Elmélete - amely ennek a disszertációnak a központjában áll - eredetileg nem a tudásmegosztás, hanem általában az emberi kapcsolatok leírását tűzte ki célul. Fiske (2004) azt állítja, hogy „a Kapcsolati Modellek Elmélete egyszerű: Az emberek csak négy különböző módon viszonyulnak egymáshoz. A kapcsolatokat a következők tekintetében rendszerezhetjük: (1) mi közös van az emberekben (2) sorba rendezett különbségek (3) additív egyensúlybeli eltérések, vagy (4) arányok. Amikor az emberek arra figyelnek, hogy mi közös van bennük, akkor az ún. Közösségi Megosztás modelljét alkalmazzák. Amikor az emberi kapcsolatok valamilyen sorba rendezettségen alapszanak, a Tekintély Rangsorolás modellje érvényesül. Amikor az emberek összeadható egyensúlybeli eltérésekre koncentrálnak, az Egyenlőség Egyeztetése modell alapján járnak el. Amikor a cselekedeteket arányok vagy értékek határozzák meg, a Piaci Árazás modelljéről beszélhetünk."

Bár ez az elmélet az emberi kapcsolatok általános leírására született meg, néhány kutató már feltételezte, hogy a tudásmenedzsment leírására is alkalmas, hiszen a tudásmegosztás is emberi kapcsolat. Már voltak kezdeményezések Fiske elméletének az alkalmazására egy kutatási központra és egy kormányzati hivatalra, de egy tanácsadó cégre vagy egy Internetes közösségre még nem. A jelen interdiszciplináris kutatás pont ezt szakadékot hidalja át.

E cél elérése érdekében a disszertáció rövid bevezetést nyújtott a tudás fogalmába és a különböző definícióiba, továbbá kitért az adat, az információ és a tudás közti különbség magyarázatára. A tudás alapvető típusainak (úgy mint a priori - a posteriori vagy implicit - explicit tudás) tárgyalása után, a tudás természete és azon belül is a gazdasági természete (tudás mint termék, mint kvázi-közjó, mint eszköz) került leírásra. Ezt a tudás értékének és a gazdaságban betöltött szerepének (a termelés, az innováció, a szellemi tulajdonjogok, stb.) a vizsgálata követte. Ez a némileg elméleti jellegű fejezet alapként szolgál a disszertáció következő része számára, hiszen a tudásmenedzsment témája nem vitatható meg tudományos szinten a tudás értékének, szerepének, típusainak és természetének ismerete nélkül.

A disszertáció bemutatta a tudásmenedzsment különböző definícióit és jellemezte a legfőbb tudásmenedzsment folyamatokat, külön kitérve a tudásmegosztás témakörére. Ennek tekintetében a tudásmenedzsment, a szervezeti kultúra és az informatika kapcsolata került megvizsgálásra. Ezen általános bevezetés után következett a tudásmegosztás motivációs elméleteinek alapos sorba vétele és Fiske elméletének részletes ismertetése.

A kutatási projekt két esettanulmányt tartalmazott. Az első - az Intenzz SAP Consulting Group-ról szóló - bebizonyította, hogy a tudásmegosztás teljesen leírható a Fiske által definiált négy kapcsolati modellel. Az esettanulmány módszertana a kvalitatív és kvantitatív technikák kombinációját tartalmazta: Először az Intenzz alkalmazottjai egy webes kérdőívet töltöttek ki. Ez lehetővé tette az Intenzz leggyakoribb tudásmegosztási szcenárióinak a beazonosítását és egyúttal kvalitatív adatokkal szolgált a négy kapcsolati modell használatáról. Második lépésként az üzleti folyamatoknak a webes kérdőív alapján készített listájának átnézése és kiegészítése céljából lebonyolított menedzsment interjúk következtek. Ennek az eredménye a folyamatoknak egy teljesebb listája lett. A harmadik lépés a webes kérdőív és a menedzsment interjúk során készített üzleti folyamatok alapján tudásfolyamatok modellezése volt. Ezek a tudásfolyamat modellek megmutatták, hogy mely tudásfolyamatok és milyen tudásmegosztás formák léteznek az Intenzz szervezetében. Végül az alkalmazottakkal folytatott interjúk lehetővé tették azon szcenáriók elemzését, amelyek a webes kérdőívben nem szerepeltek. Az üzleti és tudásfolyamatok modellezése az egyre népszerűbb szabványra, a BPMN-re épült.

Az első esettanulmányban 12 üzleti folyamat került megvizsgálásra és minden egyes üzleti folyamathoz egy tudásfolyamat lett társítva. Ezután a tudásfolyamatok különböző tudásmegosztási lépései kerültek beazonosításra és megerősítést nyert, hogy a tudásmegosztás leírható Fiske elméletének négy modelljével. Továbbá az elemzések kimutatták, hogy az első esettanulmányban a belső folyamatok motivációi 52%-ban, azaz többségben, a Közösségi Megosztás modelljét követik.

A második, a SAP Community Network-ről szóló esettanulmány kvalitatív leíró módszerekhez fordult és a kutatás ugyanarra a következtetésre jutott: a négy modell alkalmazható és teljes mértékben leírják a tudásmegosztást a Network-ben.

Bármely adott szituációban a négy modell egyszerre jelen lehet. A résztvevők különböző szituációkban, - de akár egy adott szituációban is - különböző modellek alapján kommunikálhatnak. A modelleknek ezt a keverékét tudásmegosztási mintáknak nevezzük. Ezeket a mintákat vizsgálta meg mindkét esettanulmány és az Intenzz esetében a Közösségi Megosztás dominanciáját sikerült bizonyítani.

A kutatás exploratív módszerei és eredményei lehetővé tették a tudásmegosztási minták rangsorának elkészítését és olyan iránymutatások megfogalmazását, amelyek segítettek Intenzz-nek a tudásmegosztási gyakorlataik fejlesztésében. Ez a gyakorlati haszon demonstrálta Fiske elméletének értékét. A négy modell és a tudásmegosztási minták egy, a tudomány számára értékes megközelítést jelentenek és egyúttal, mint minden jó elmélet, a gyakorlatban is jól hasznosíthatóak. Az exploratív kutatás további érdeme, hogy lefektette azokat az alapokat és megfogalmazta azokat a bizonyítandó állításokat, amelyeket egy következő magyarázó és bizonyító kutatás tesztelhet.

Amint a disszertáció ajánlásai is kiemelték, a tudásmegosztás egy új példája terjedt el az utóbbi években a szabad szoftver mozgalom formájában. A szerző feltételezi, hogy a négy modell le képes írni a tudásmegosztást ebben az új relációban is, azonban ennek bizonyítása egy következő kutatás témája lehet.

8 APPENDICES

8.1 APPENDIX 1: References

ABECKER A. et al. (2000): Context-aware, proactive delivery of task-specific knowledge: The KnowMore project. International Journal on Information Systems Frontiers. Special Issue on Knowledge Management and Organizational Memory. 2(3/4). p. 139–162.

ABECKER A. et al. (2002): Geschaeftsprozess-orientiertes Wissensmanagement. Berlin: Springer. (Xpert.press) 472 p.

ACKERMAN M.S. (1996): Definitional and Contextual Issues in Organizational and Group Memories. *Information, Technology and People*. 9(1). p. 10-24.

ACKOFF R. (1989): From Data to Wisdom. *Journal of Applied Systems Analysis*. 16. p. 3-9.

ADAR E. & HUBERMAN B.A. (2000): Free Riding on Gnutella. First Monday. 5(10). Available at: http://firstmonday.org/issues/issue5_10/adar/index.html (Last accessed Jan 25, 2008)

AKERLOF G.A. (1970): The Market for 'Lemons': Quality Uncertainty and the Market Mechanism. *The Quarterly Journal of Economics*. MIT Press. 84(3). p. 488-500.

ALCHIAN A. & DEMSETZ H. (1972): Production, Information Costs, and Economic Organization. *The American Economic Review*, 62, p. 777-795.

ALLEE V. (2003): The Future of Knowledge: Increasing Prosperity Through Value Networks. Burlington: Elsevier Science. 322 p.

ALLEE V. (1997): The knowledge evolution: Expanding organizational intelligence. Boston(MA): Butterworth-Heinemann. 296 p.

ALLEN T.J. (1977): Managing the flow of technology. Cambridge: MIT Press. 332 p.

ALMEIDA P. & KOGUT B. (1999): Localization of Knowledge and the Mobility of Engineers in Regional Networks. *Management Science*, 45(7), p. 905-917.

ALWERT K. & ULBRICH C. (2002): Meeting of SIG Processes in VISION Project. Competence Center Wissensmanagement. Available at: http://www.knowledgeboard.com/doclibrary/knowledgeboard/021209vision_sig_berlin_%20ipk.pdf (Last accessed May 8, 2008)

AMABILE T. (1997): Motivating Creativity in Organizations. *California Management Review*. 40 (1). p. 39-58.

ANDREWS K.M. & DELAHAYE B.L. (2000): Influences on knowledge processes in organizational learning. *Journal of Management Studies*. 37(6). p. 797-810.

ANDRIESSEN J.H.E. (2006): To share or not to share, that is the question. Conditions for the willingness to share knowledge. Delft: Delft Innovation System Papers. 41 p.

APQC (1999): Creating a knowledge-sharing culture. Houston, Texas: American Productivity and Quality Center. 92 p.

ARISTOTLE (350 B.C.): Metaphysics. Translated by Ross W. D. Oxford: Clarendon Press. 1924.

ARROW K. (1962): Economic Welfare and the Allocation of Resources for Invention. In R.R. Nelson (ed.): *The rate and direction of inventive activity: economic and social factors*. Princeton: Princeton University Press. p. 609-625.

BABBIE E. R. (2009): The Practice of Social Research. Belmont (CA): Wadsworth Publishing. 12th edition. 624 p.

BAILEY N. (2003): Information brokering – the future of portals. Monash University. Caulfield East (Australia): Information Technology Services. Available at: http://polynate.net/work/ausweb/2003/AusWebMetaSearch.pdf (Last accessed July 5, 2008)

BARONI DE CARVALHO R. & TAVARES FERREIRA M.A. (2001): Using information technology to support knowledge conversion processes. *Information Research*. 7(1). Available at: http://InformationR.net/ir/7-1/paper118.html (Last accessed July 5, 2008)

BAWDEN D. (1986): Information systems and the stimulation of creativity. *Journal of Information Science*. 12(4). p. 203-216.

BECHINA A.A. & BOMMEN T. (2006): Knowledge Sharing Practices: Analysis of a Global Scandinavian Consulting Company. *The Electronic Journal of Knowledge Management*. 4(2). p. 109 - 116. Available at: http://www.ejkm.com/volume-4/v4-i2/Bechina.pdf (Last accessed July 20, 2008)

BECKMAN T.J. (1999): The Current State of Knowledge Management. In: Liebowitz J.: Knowledge Management Handbook. Boca Raton (FL): CRC Press. p. 1-22.

BELLINGER G. & CASTRO D. & MILLS A. (2004): Data, Information, Knowledge, and Wisdom. Available at: http://www.systems-thinking.org/dikw/dikw.htm (Last accessed July 5, 2008)

BELOTTI V. & BLY S. (1996): Walking away from the desktop computer: Distributed collaboration and mobility in a product design team, In *Proceedings of the CSCW 96 conference*. Cambridge (MA): ACM. p. 209-218.

BENBASAT I. & GOLDSTEIN D.K. & MEAD M. (1987): The case research strategy in studies of information systems. *MIS Quarterly*. 11(3). p. 369-386.

BERLO D.K. (1960): The process of communication. New York: Holt, Rinehart and Winston. 318 p.

BERNDT R. (2004): Competitiveness und Ethik. Berlin. Springer. 308 p.

BIJ H. VAN DER & SONG X.M. & WEGGEMAN M. (2003): An empirical investigation into the antecedents of knowledge dissemination at the strategic business unit level. *Journal of Product Innovation Management*. 20(2). 163-179.

BLICH A. (2006): SAP Developer Network: Leverage Community Resources, Knowledge and Experience. Available at: https://www.sdn.sap.com/irj/sdn/go/portal/prtroot/docs/library/uuid/6c1d59d9-0b01-0010-b18e-f2a27d84734e (Last accessed March 19, 2008)

BOCK G.W. & KIM Y.-G. (2003): Exploring the influence of rewards on attitudes towards knowledge sharing. In Khosrow-Pour M. (Ed.): *Advanced topics in information resources management*. Hershey (PA): Idea Group Publishing.

BOCK G.W. et al. (2005): Behavioral Intention Formation In Knowledge Sharing: Examining The Roles Of Extrinsic Motivators, Social-Psychological Forces, And Organizational Climate. *MIS Quarterly*. 29(1) p. 87-111.

BOER N.I. & BERENDS H. (2003): The Relational Dimension of Knowledge Sharing: An empirical study of an industrial research group. Proceedings of the Fourth European Conference on Organizational Knowledge, Learning and Capabilities, April 13/14. Barcelona, Spain.

BOISOT M. (1998): Knowledge Assets: Securing Competitive Advantage in the Information Economy. Oxford University Press. London. 312 p.

BOER N.I. & VAN BAALEN P. J. & KUMAR K. (2004): The implications of different models of social relations for understanding knowledge sharing. In Tsoukas H. & Mylonopoulos N. (Eds): *Organizations as knowledge systems: Knowledge, learning and dynamic capabilities*. Hampshire: Palgrave Macmillan. p. 130-153.

BONIFACIO M. & CAMUSSONE P. (2003): Managing the KM Trade-Off: Knowledge Centralization Versus Distribution. Technical Report # DIT-03-029. Available at:

http://eprints.biblio.unitn.it/archive/00000423/01/029.pdf (Last accessed January 11, 2008)

BORGATTI S.P. & CROSS R. (2003): A Relational View of Information Seeking and Learning in Social Networks. *Management Science*. 49(4). p. 432-445.

BRANTJES E. (2005): Point crazy on SDN. Available at: https://www.sdn.sap.com/irj/sdn/thread?threadID=401981 (Last accessed July 2, 2008)

BRINT (2007): Knowledge Management and Organizational Learning. Available at: http://www.brint.com (Last accessed July 6, 2008)

CAREY R.F. (2007): SAP: A Company Transforms Itself Through Social Media. SocialMediaToday.com. Available at: http://www.google.com/url?sa=t&ct=res&cd=1&url=http%3A%2F%2Fwww.socialmediatoday.com%2FClientFiles%2F2b461d74-0b05-4149-a6fd-33257181a2c7%2Fsapnetworks.pdf&ei=C51qSPG8CJL00AX4-vipDA&usg=AFQjCNEP7I-6rs37gpSZcdVTZwUiP2rAaw&sig2=bKB_FVZFX5ufXgFIczy8-g (Last accessed March 17, 2008)

CHAUDHARY R. (2003): Motivation behind open source. Javageek's World. Available at: http://www.artima.com/weblogs/viewpost.jsp?thread=20107 (Last accessed June 10, 2008)

CHEUNG P.K. & CHAU P.Y.K. & AU A.K.K. (2008): Does Knowledge Reuse Make a Creative Person More Creative? *Decision Support Systems*. 45(2). p. 219-227.

CHOI I. & JUNG J. & SONG M. (2004): A framework for the integration of knowledge management and business process management. *International Journal Innovation and Learning*. 1(4). p. 399–408.

CHRISHOLM R. (1966): Theory of Knowledge. Prentice Hall. New York. 144 p.

CIBORRA C.U. & PATRIOTTA G. (1996): Groupware and teamwork in new product development: the case of a consumer goods multinational. In Ciborra C.U. (Ed.): Groupware and teamwork: Invisible Aid or Technical Hindrance? Chichester (UK): John Wiley & Sons. 240 p.

CLANCEY W. J. (1997): The Conceptual Nature of Knowledge, Situations, and Activity. In Feltovich P. & Hoffman R. & Ford K. (Eds.): *Human and Machine Expertise in Context*. Menlo Park (CA): The AAAI Press. p. 247-291. Available at: http://cogprints.org/475/0/142.htm. (Last accessed July 2, 2008)

CLEVELAND H. (1982): Information as Resource. *The Futurist*. 12. p. 34-39.

COHEN W.M. & LEVINTHAL D.A. (1990): Absorptive Capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*. 35. p. 128-152.

CONKLIN E. J. (1996): Designing organizational memory: preserving intellectual assets in a knowledge economy. Glebe Creek (MD): CogNexus Institute. 41 p. Available at: http://cognexus.org/dom.pdf (Last accessed April 23, 2008)

CONNOLLY T. & THORN B.K. (1990): Discretionary databases: theory, data, and implications. In Fulk J. & Steinfield C. (eds.): *Organizations and communication technology*. London: Sage. p. 219-233.

CONSTANT D. & KEISLER S. & SPROULL L. (1994): What's mine is ours, or is it? A study of attitudes about information sharing. *Information Systems Research*. 5. p. 400-422.

CORNFORD F. M. (1957): Plato's theory of knowledge; The Theaetetus and the Sophist. New York:. Liberal Arts Press. (Dover Philosophical Classics) 336 p.

COWAN R. & DAVID P. A. & FORAY D. (1999): The Explicit Economics of Knowledge Codification and Tacitness. Strasbourg: 3rd TIPIK Workshop. Available at: http://www-econ.stanford.edu/faculty/workp/swp99027.pdf (Last accessed February 10, 2008)

DALLE J.M. & DAVID P.A. (2003): The allocation of software development resources in 'open source' production mode. Cambridge (MA): MIT Working Paper. Available at: http://opensource.mit.edu/papers/dalledavid.pdf (Last accessed June 26, 2008).

DALMARIS P. (2006): A framework for the improvement of knowledge-intense business processes. PhD thesis. University of Technology. Sydney, Australia.

DARKE P. & SHANKS G. & BROADBENT M. (1998): Successfully completing case study research: combining rigour, relevance and pragmatism. *Information Systems Journal*. 8(4). p. 273-289.

DARR E. & KURTZBERG T. (2000): An Investigation of Partner Similarity Dimensions on Knowledge Transfer. *Organizational Behavior and Human Decision Processes*. 82(5). p. 28-44.

DAVENPORT T.H. & PRUSAK L. (2000): Working Knowledge: How Organizations Manage What They Know. Boston: Harvard Business School Press. 226 p.

DAVENPORT T. H. & PRUSAK L. (2001): Tudásmenedzsment. Budapest: Kossuth Kiadó. 196 p.

DECAROLIS D.M. & DEEDS D.L. (1999): The impact of stocks and flows of knowledge on firm performance. *Strategic Management Journal*. 20: p. 953-968.

DE DREU C.K.W. (2007): Cooperative Outcome Interdependence, Task Reflexivity, and Team Effectiveness: A Motivated Information Processing Perspective. *Journal of Applied Psychology*. 92(3). p. 628–638.

DEEN V. (2010): 10 Trends in de ICT. Available at: http://computerworld.nl/article/12055/10-trends-in-de-ict.html (Last accessed April 4, 2011)

DESCARTES R. (1640): Letter to Mersenne, 30 July 1640. In: Adam & Tannery (1964-74), vol. III, no. 199. Also in: Tannery P. & de Waard C. (1932-88). Paris: Presses Univsitairés de France. Vol. IX, no. 899.

DIANE R. & ZAHEER S. & ANDERSON M. (2000): Sources of Managers' Knowledge of Organizational *Capabilities. Organizational Behavior and Human Decision Processes* 82(5): p. 134-149

DIGNAN L. (2007): Gartner: The future of portals is mashups, SOA, more aggregation. Available at: http://blogs.zdnet.com/BTL/?p=4912 (Last accessed April 24, 2008)

DONALDSON L. (1990): The Ethereal Hand: Organizational Economics and Management Theory. *Academy of Management Review*. 15. p. 369-381

DONEY P.M. & CANON J.P. (1997): An examination of the nature of trust in buyer-seller relationships. *Journal of Marketing*. 61(2). p. 35-51.

DRUCKER P.F. (1959): Landmarks of Tomorrow: A Report on the New 'Post-Modern' World. New York: Harper. 270. p.

DRUCKER P.F. (1989): The New Realities. New York: Harper & Row. Available as e-book at: http://www.harpercollins.com/books/9780066620275/New_Realities/index.aspx (Last accessed July 7, 2008)

EAMES E. R. & BLACKWELL K. (1984): Theory of knowledge. The 1913 Manuscript. London: George Allen & Unwin. 258 p.

THE ECONOMIST (1996): The World Economy Survey. *The Economist*. September 28, 1996. p. 43.

EDVINSSON L. (1997): Developing intellectual capital at Skandia. *Long Range Planning*. 30(3). p. 366-373.

EDVINSSON L. & MALONE M.S. (1997): Intellectual Capital: Realizing your Company's True Value by Finding Its Hidden Brainpower. New York: Harper Business. 225 p.

EISENHARDT K.M. (1989): Building theories from case study research. *Academy of Management Review*. 14(4). p. 352-550.

ELIOT T.S. (1934): The Rock. Faber & Faber.

ELLIOTT K. (2007a): Satisfaction is Sweet. Available at: https://www.sdn.sap.com/irj/sdn/weblogs?blog=/pub/wlg/6186 (Last accessed July 20, 2008)

ELLIOT K. (2007b): Pulse-check on the SDN/BPX communities. Available at: https://www.sdn.sap.com/irj/sdn/weblogs?blog=/pub/wlg/7537 (Last accessed July 20, 2008)

ENCYCLOPEDIA BRITANNICA ONLINE (2008): Motivation. Available at: http://www.britannica.com/EBchecked/topic/394212/motivation (Last accessed June 3, 2008)

FINNERN M. & ELDER E. (2005): SDN Feedback Session: Best Sacrifices for Error-Free Elf Code. SAP. Available at: http://www.google.com/url?sa=t&ct=res&cd=2&url=https%3A%2F%2Fwww.sdn.sap.com%2Firj%2Fservlet%2Fprt%2Fportal%2Fprtroot%2Fdocs%2Flibrary%2Fuuid%2F104cf540-0301-0010-2ea0-9f2192e3fec7&ei=MqNrSL24EYzW7QWX4JjKDA&usg=AFQjCNHZVMNGu4CKqwfdSra5m4u5FOtd3A&sig2=OYVXIpp-5nU7hfCUFkBZng (Last accessed May 22, 2008)

FINNERN M. (2006): Wipro passed 100K SDN Points. Congratulations. Available at: https://www.sdn.sap.com/irj/sdn/weblogs?blog=/pub/wlg/3713 (Last accessed July 18, 2008)

FISKE A.P. (1991): Structures of Social Life: The Four Elementary Forms of Human Relations. New York: Free Press (Macmillan). 500 p.

FISKE A. P. (1992): The four elementary forms of sociality: framework for a unified theory of social relations. *Psychological Review*. 99. p. 689-723.

FISKE A.P. (2004): Relational Models Theory 2.0. In Haslam N. (ed.) (2004): *Relational Models Theory: A Contemporary Overview*. London: Psychology Press. p. 3-25.

FISKE A.P. (2006): Social Relations: Culture, Development, Natural Selection, Cognition, the Brain, and Pathology. In Van Lange P.A.M. (ed.) (2006): *Bridging Social*

Psychology: Benefits of Transdisciplinary Approaches. London: Lawrence Erlbaum Associates. p. 293-297.

FISKE A.P. & HASLAM N. (1997): The structure of social substitutions: a test of relational models theory. *European Journal of Social Psychology*. 27. p. 725-729.

FISKE A.P. & TETLOCK P.E. (1997): Taboo Trade-offs: Reactions to Transactions That Transgress the Spheres of Justice. *Political Psychology*. 18(2). Special Issue: Culture and Cross-Cultural Dimensions of Political Psychology (Jun., 1997). p. 255-297.

FITZ-ENZ J. (1997): The 8 Practices of Exceptional Companies: How Great Organizations Make the Most of Their Human Assets. New York: American Management Association. 266 p.

FOO M.D. et al. (2006): Effects of Team Inputs and Intrateam Processes on Perceptions of Team Viability and Member Satisfaction in Nascent Ventures. *Strategic Management Journal*. 27(4). p. 389-399.

FOSTER A. & FORD N. (2003): Serendipity and information seeking: an empirical study. *Journal of Documentation*. 59(3). p. 321-340.

FREUD S. (1955): Beyond the Pleasure Principle. S.E. XVIII. London: Hogarth Press. 64 p.

FREY B. & JEGEN R. (2001): Motivation Crowding Theory. *Journal of Economic Surveys*. 15 (5). p. 589-611.

FRICKE M. (2009): The knowledge pyramid: a critique of the DIKW hierarchy. *Journal of Information Science*. 35(2). p. 131-142.

GARNETT R. F. (1999): What Do Economists Know?: New Economics of Knowledge. London: Routledge. 272 p.

GARTNER (2010): Gartner Identifies the Top 10 Strategic Technologies for 2011. Available at: http://www.gartner.com/it/page.jsp?id=1454221 (Last accessed April 4, 2011)

GEEN R. (1994): Human motivation: A psychological approach. Florence (KY): Wadsworth Publishing. 368 p.

GERSICK C.J.G. & HACKMAN J.R. (1990): Habitual routines in task-performing groups. *Organizational Behavior and Human Decision Processes*. 47. p. 65-97.

GETTIER E. L. (1963): Is Justified True Belief Knowledge? *Analysis*. 23. p. 121-3. Available at: http://www.ditext.com/gettier/gettier.html (Last accessed October 11, 2007)

GLASER B.G. & STRAUSS A.L. (1967): The discovery of grounded theory: Strategies for qualitative research. Beverly Hills (CA): Sage. 271 p.

GLASER B.G. (1995): Grounded theory 1984-1994 (Vol. 1.) Mill Valley (CA): Sociology Press. 443 p.

GLAZER R. (1998): Measuring the knower: towards a theory of knowledge equity. California Management Review. 40(3). p. 175-194.

GODFREY J. ET AL. (2010): Accounting Theory. 7th Edition. New York: John Wiley and Sons. 542 p.

GOOGLE (2007): What is the Google Maps API? Available at: http://code.google.com/apis/maps/ (Last accessed March 30, 2008)

GOOGLE (2011): Google history. Available at: http://www.google.com/corporate/history.html (Last accessed March 30, 2011)

GRANT R.M. (1996): Toward a knowledge-based theory of the firm. *Strategic Management Journal*. 17 (Winter Special Issue). p. 109-122.

GREEN L.G. (1999). Economics of Open Source Software. Available at: http://badtux.org/home/eric/editorial/economics.php (Last accessed April 26, 2008)

GROLIK S. ET AL. (2003): Analysis of Interrelations between Business Models and Knowledge Management Strategies in Consulting Firms. Proceedings of the 11th European Conference on Information Systems. ECIS 2003. Naples, Italy. June 16-21, 2003 Available at: http://is2.lse.ac.uk/asp/aspecis/20030056.pdf (Last accessed June 28, 2008)

GRONAU N. ET AL. (2003): Modellierung von wissensintensiven Geschaeftsprozessen mit der Beschreibungssprache K-Modeler. In Reimer U. et al. (Eds): Proceedings of WM2003, 2. Konferenz Professionelles Wissensmanagement - Erfahrungen und Visionen. Luzern (CH). 2-4 April 2003.

GROSSMAN S.J. & STIGLITZ J.E. (1980): On the Impossibility of Informationally Efficient Markets. *American Economic Review*. 70(3). p. 393-408.

GRUBER H. & DUXBURY L. (2002): Does Organizational Culture Affect the Sharing of Knowledge? Available at: http://www.hc-sc.gc.ca/iacb-dgiac/km-gs/english/duxbury_en.pdf (Last accessed February 19, 2008)

GURTEEN D. (1999): Creating a Knowledge Sharing Culture. *Knowledge Management Magazine*. 2(5). Available at:

http://www.gurteen.com/gurteen/gurteen.nsf/0/FD35AF9606901C42802567C70068CBF5/ (Last accessed July 7, 2008)

HAGEL J. & BROWN J.S. (2008): How SAP Seeds Innovation. *BusinessWeek*. July 23, 2008. Available at: http://www.businessweek.com/innovate/content/jul2008/id20080723_353753.htm (Last accessed March 28, 2010)

HAGSTRÖM, W.O. (1965): The Scientific Community. New York: Basic Books. 304 p.

HALL H. (2001a): Input-friendliness: Motivating knowledge sharing across intranets. *Journal of Information Science.* 27. p. 139-146.

HALL H. (2001b): Social exchange for knowledge exchange. Paper presented at Conference Managing Knowledge: conversations and critiques, University of Leicester Management Centre, 10-11 April 2001.

HALL J. & SAPSED J. (2005): Influences of knowledge sharing and hoarding in project-based firms. In: Love P. & Fong P. & Irani Z. (Eds): Management of Knowledge in Project Environments. Oxford: Elseveier Butterworth-Heinemann. p. 57-79.

HÁMORI B. (2004): Bizalom, jóhírnév és identitás az elektronikus piacokon. *Közgazdasági Szemle*. 51. p. 832–848.

HANCOCK P.A. (1987): Arousal theory, stress and performance: Problems of incorporating energetic aspects of behavior into human-machine systems function. In: L.S. Mark, J.S. Warm, & R.L. Huston (Eds.). *Ergonomics and Human Factors: Recent Research*. New York: Springer-Verlag. p. 170-179.

HANSEN M.T. (1999): The search-transfer problem. *Administrative Science Quarterly.* 44. p.82-111.

HARDIN G. (1968): The tragedy of the commons. Science. 162. p. 1243-1248.

HASLAM N. (2004): Relational Models Theory: A Contemporary Overview. Mahwah (NJ): Lawrence Erlbaum & Associates. 392 p.

HAYEK F. (1945): The Use of Knowledge in Society. *American Economic Review*. 35(4). p. 519-530. Available at: http://www.econlib.org/library/Essays/hykKnw1.html (Last accessed January 17, 2008)

HAYEK F. (1936): Economics and knowledge. A presidential address to the London Economic Club, 10 November 1936. First published in *Economica*. New Series. 4(13). February 1937. p. 33-54. Available at: http://www.econlib.org/library/NPDBooks/Thirlby/bcthLS3.html (Last accessed July 7, 2008)

HEISIG P. (2001): Business Process oriented Knowledge Management - Methode zur Verknuepfung von Wissensmanagement und Geschaeftsprozessgestaltung. In Proceedings of WM2001, 1. Konferenz Professionelles Wissensmanagement, Baden – Baden

HENDERSON S. & PEIRSON G. & HERBOHN K. (2007): Issues in Financial Accounting. 13th Edition. Melbourne, Australia: Longman Cheshire. 1088 p.

HENDRIKS P. (1999): Why share knowledge? The influence of ICT on the motivation of knowledge sharing. *Knowledge and Process Management*. 6. p. 91-100.

HILBERT M. & LÓPEZ P. (2011): The World's Technological Capacity to Store, Communicate, and Compute Information. *Science*. 1200970 DOI:10.1126/science. 1200970 Available at: http://www.sciencemag.org/content/early/2011/02/09/science.1200970.full.pdf?keytype=ref&siteid=sci&ijkey=89mdkEW.yhHlM (Last accessed March 30, 2011)

HILDRETH P. & KIMBLE C. (2002): The duality of knowledge. *Information Research*. 8(1). Paper no. 142. Available at: http://InformationR.net/ir/8-1/paper142.html (Last accessed March 27, 2010)

HILDRETH P. & WRIGHT P. & KIMBLE C. (1999): Knowledge management: are we missing something? In 4th UKAIS Conference. York. London: McGraw Hill. p. 347-356.

HOLBORN H. (1959): A History Of Modern Germany: The Reformation. Princeton (NJ): Princeton university Press. 243 p.

HUBER G.P. (1991): Organizational learning: the contributing processes and the literature. *Organization Science.* 2(1). p. 88-115.

HULL C. (1943): Principles of Behavior. New York: Appleton-Century-Crofts. 304 p.

HUME D. (1748): An Enquiry Concerning Human Understanding (First published as Philosophical Essays Concerning Human Understanding). Oxford: Clarendon Press. 165 p. Available at: http://www.gutenberg.org/etext/9662 (Last accessed July 7, 2008)

HUTCHINS E. (1995): Cognition in the wild. Cambridge: MIT Press. 401 p.

HUYSMAN M. & WIT D.D. (2002): Knowledge sharing in practice. Dordrecht: Kluwer Academic. 204 p.

IDC (2010): The Digital Universe Decade (2010) - Are You Ready? Available at: http://www.emc.com/collateral/demos/microsites/idc-digital-universe/iview.htm (Last accessed March 26, 2011)

IJIRI Y. (1971): A Defence for Historical Cost Accounting. In Sterling R.R. (ed.): Asset Valuation and Income Determination. Lawrence, Kansas: Scholars Book. p. 1-14.

JABLONSKI S. & HORN S. & SCHLUNDT M. (2001): Process Oriented Knowledge Management. In Eleventh International Workshop on Research Issues in Data Engineering: Document Management for Data Intensive Business and Scientific Applications. IEEE Computer Society. Heidelberg, p. 77–84.

JEHN K.A. (1995): A Multimethod Examination of the Benefits and Detriments of Intragroup Conflict. *Administrative Science Quarterly*. 40(2). p. 256-282.

JENSEN M. & MECKLING W. (1976): Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*. 3. p. 305-360.

JEPPESEN L.B. & LAURSEN K. (2007): Lead Users as Facilitators of Knowledge Sharing in a Community Setting. Available at: http://www.druid.dk/wp/pdf_files/07-24.pdf (Last accessed April 26, 2008)

JOPPE M. (2000): The Research Process. Available at: http://www.uoguelph.ca/htm/MJResearch/ResearchProcess/ExploratoryResearch.htm (Last accessed February 27, 2011)

JØRGENSEN H.D. (2004): Interactive Process Models. PhD Thesis. Department of Computer and Information Science. Norwegian University of Science and Technology. Trondheim, Norway. 304 p.

JOVANOVIC B. & ROB R. (1989): The Growth and Diffusion of Knowledge. *Review of Economic Studies*. Blackwell Publishing. 56(4). p. 569-82.

KALPIC B. & BERNUS P. (2006): Business process modeling through the knowledge management perspective. *Journal of Knowledge Management*. 10(3). p. 40-56.

KAPLAN R.S. & NORTON D.P. (1992): The balanced scorecard: measures that drive performance. *Harvard Business Review*. 70(1). p. 71-80.

KAPLAN B. & MAXWELL J.A. (1994): Qualitative Research Methods for Evaluating Computer Information Systems. In Anderson J.G. & Aydin C.E. & Jay S.J. (eds.) (1994): *Evaluating Health Care Information Systems: Methods and Applications*. Thousand Oaks (CA): Sage. p. 45-68.

KATZ R. & ALLEN T. (1982): Investigating the not invented here (NIH) syndrome: A look at the performance, tenure and communication patterns of 50 R&D projects groups. *R&D Management*. 12(1). p. 7-19.

KELLEY H.H. & THIBAUT J.W. (1978): Interpersonal relations: A theory of interdependence. New York: Wiley.

KELMAN H.C. (1958): Compliance, Identification and Internalisation. Three processes of attitude change. *Journal of Conflict Resolution*. 2. p. 51-60.

KEYNES J. M. (1937): The General Theory of Employment. *Quarterly Journal of Economics*. 51(2). p. 209-223.

KHAN M. & LODHI S. & MAKK M. (2010): Measuring Team Implicit Coordination. *Australian Journal of Basic and Applied Sciences*. 4(6). p. 1211-1136.

KIM D.H. (1993): The link between individual and organizational learning. *Sloan Management Review*. 35(1). p. 37-50.

KM MAGAZINE (1999): Sharing Knowledge — and Other Unnatural Acts. Available at: http://kmmag.com/kmmagn2/km200001/departf1.htm (Last accessed November 12, 2006)

KOGUT B. & ZANDER U. (1992): Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology. *Organization Science*. 3(3). p. 383-397.

KOLLOCK P. (1998): Social dilemmas: the anatomy of cooperation. *Annual Review of Sociology*. 22. p. 183-205.

KREPS D.M. (1997): Intrinsic Motivation and Extrinsic Incentives. *The American Economic Review*. 87(2). p. 359-364.

VON KROGH G. & ROOS J. (1996): Knowledge creation through cooperative experimentation. In Von Krogh G. & Roos J. (Eds.): *Managing knowledge. perspectives on cooperation and competition*. London: Sage. p. 184-202.

KROGH G. VON & ICHIJO K. & NONAKA I. (2000): Enabling Knowledge Creation. Oxford: Oxford University Press. 304 p.

KUGEL J. & SCHOSTEK C. (2004): Rewards for knowledge sharing? Available at: http://www.gurteen.com/gurteen/gurteen.nsf/id/rewards-k-sharing (Last accessed October 5, 2007)

KVANVIG J. L. (2003): The value of knowledge and the pursuit of understanding. Cambridge Studies in Philosophy. Cambridge: Cambridge University Press. 232 p.

LADD D.A. & HEMINGER A.R. (2003): An Investigation of Organizational Culture Factors That May Influence Knowledge Transfer. Proceedings of the 36th Hawaii International Conference on System Sciences. Hawaii. Available at: http://ieeexplore.ieee.org/iel5/8360/26341/01174274.pdf?isnumber=26341&prod

=CNF&arnumber=1174274&arSt=+9+pp.&ared=&arAuthor=Ladd%2C+D.A.%3B+Heminger%2C+A.R. (Last accessed July 7, 2008)

LAM A. & LAMBERMONT-FORD J.P. (2008): Knowledge Creation and Sharing in Organisational Contexts: A Motivation-based Perspective. School of Management Working Paper Series SoMWP-0801, Royal Holloway University of London. Available at: http://digirep.rhul.ac.uk/items/131ed35a-1caa-3675-82f4-6476031f27b5/1/ (Last accessed June 6, 2010)

LANGAN-FOX J. & ANGLIM J. & WILSON J.R. (2004): Mental Models, Team Mental Models and Performance: Process, Development and Future Directions. Distinguished Paper Series. *Human Factors & Ergonomics in Manufacturing*. Hoboken (NJ): Wiley InterScience. 14(4). p. 1-21.

LANSDALE M. (1988): The psychology of personal information management. *Applied Ergonomics*. 19(1). p. 55-66.

LAVE J. & WENGER E. (1991): Situated learning: Legitimate Peripheral participation. Cambridge: Cambridge University Press. 138 p.

LEET M. (2004): Aftereffects of Knowledge in Modernity: Politics, Aesthetics, and Individuality. Albany: State University of New York. 164 p.

LEHNEN S. & GALLMAN J. (2004): Community Content for SAP NetWeaver: A Matter of Give and Take. SAP. Available at: http://www.google.com/url?sa=t&ct=res&cd=1&url=https%3A%2F%2Fwww.sdn.sap.com%2Firj%2Fservlet%2Fprt%2Fportal%2Fprtroot%2Fdocs%2Flibrary%2Fuuid%2Fcda5da90-0201-0010-e1a4-cb66125d927d&ei=pZ1rSNPiL5Hy7AXm7_nWDA&usg=AFQjCNGI_TNY1AokY3efmAJxmvdWlAtUjA&sig2=BjOMTucXv_HxT_REJwUyBQ (Last accessed May 20, 2008)

LEONARD D. & SENSIPER S. (1998): The role of tacit knowledge in group innovation. *California Management Review*. 40(3). p. 112-132.

LERNER J. & TIROLE J. (2002): Some simple economics of the Open Source. *The Journal of Industrial Economics*. 2 (L). p. 197-234.

LEV B. (2001): Intangibles: Management, Measurement and Reporting. Washington: Brookings Institution. 216 p.

LEVESQUE L.L. & WILSON J.M. & WHOLEY D.R. (2001): Cognitive divergence and shared mental models in software development project teams. *Journal of Organizational Behavior*. 22(2). p. 135-144.

LEVITT B. & MARCH J.G. (1988): Organizational learning. *Annual Review of Sociology*. 14. p. 319-340.

LIEBOWITZ J. & CHEN Y. (2003): Knowledge sharing proficiencies: The key to knowledge management. In Holsapple C.W. (Ed.): *Handbook on knowledge management*. New York: Springer-Verlag. p. 408-438.

LOASBY B.J. (1993): Institutional Stability and Change in Science and the Economy. In Mäki U. & Gustafsson B. & Knudsen C. (Eds.): *Rationality, Institutions and Economic Methodology*. London and New York. p. 203-221.

LOFLAND J.A. ET AL. (2006): Analyzing social settings: A guide to qualitative observation and analysis. 4th Edition. Belmont (CA): Wadsworth. 304 p.

MADHAVAN R. & GROVER R. (1998): From embedded knowledge to embodied knowledge. *Journal of Marketing*. 62. p. 1-12.

MAHNKE V. (1998): The Economies of Knowledge-Sharing: Production- and Organization Cost Considerations. IVS. 28. p. 98-14.

MALHOTRA Y. (2003): The knowledge application gap in information systems research and education and their quest for the dependent variable. *Information Resources Management Journal*. 16(2). p. 1-7.

MARKUS M.L. (2001): Toward a Theory of Knowledge Reuse: Types of Knowledge Reuse Situations and Factors in Reuse Success. *Journal of Management Information Systems*. 18(1). p. 57-93.

MARWICK A.D. (2001): Knowledge management technology. *IBM Systems Journal*. 40(4). p. 814-830.

MASLOW A.H. (1968): Towards a psychology of being. New York: Van Nostrand. 240 p.

MCCAIN R. A. (2007): Essential Principles of Economics: A Hypermedia Text. Available at: http://william-king.www.drexel.edu/top/prin/txt/EcoToC.html (Last accessed July 23, 2007)

MCCARTHY J.D. & SASSE M.A. & RIEGELSBERGER J. (2002): Free Rides for Everyone? The Costs of Privacy and the Designers' Dilemma. In: Pascoe J. et al. (Eds.)(2002): *Communicating Process Architectures*. Amsterdam: IOS Press. Available at: ftp://ftp-sop.inria.fr/acacia/COOP2004/soumissions/coop2004-McCarthy-40.pdf (Last accessed August 2, 2008)

MCDERMOTT R. (1999): Learning Across Teams: The Role of Communities of Practice in Team Organizations. *Knowledge Management Review*. 8. 32-36.

MERRILL D. (2006): Mashups: The new breed of Web app. An introduction to mashups. Available at: http://www.ibm.com/developerworks/xml/library/x-mashups.html (Last accessed April 2, 2008)

MERTINS, K & HEISIG, P. & VORBECK J. (2003): Knowledge Management: Concepts and Best practices in Europe. Berlin: Springer-Verlag. 2nd edition. 383 p.

MICHAILOVA S. & HUSTED K. (2001): Dealing with knowledge sharing hostility. MPP Working Paper No. 10/2001. Available at: http://ir.lib.cbs.dk/download/ISBN/8790403975.pdf (Last accessed March 3, 2008)

MILES M.B. & HUBERMAN A.M. (1984): Qualitative Data Analysis: A Sourcebook of New Methods. Newbury Park: Sage Publications. 311 p.

MISHRA A.K. (1996): Organisational Responses to Crisis: The Centrality of Trust. In Tyler R.M.K.T.R. (ed): *Trust in Organisations*. Thousand Oaks (CA): Sage. p. 261-287.

MOKYR J. (2002): Gifts of Athena: Historical Origins of the Knowledge Economy. New Jersey: Princeton University Press. 376 p.

MOENAERT R.K. & SOUDER W.E. (1990): An analysis of the use of extrafunctional information by R&D and marketing personnel. *Journal of Product Innovation Management.* 7. p. 213-229.

MOENAERT R.K. & SOUDER W.E. (1996): Context and antecedents of information utility at the R&D / marketing interface. *Management Science.* 42(11). p. 1592-1610.

MOLLENHAUER R. (2003): Key Functionalities of SAP Community. In Rauterberg M. et al. (Eds.) (2003): *Human-Computer Interaction ─ INTERACT'03*. IOS Press. p. 1109-1110.

MORRISSEY O. & WILLEM TE VELDE D. & HEWITT A. (2002): Defining International Public Goods: Conceptual Issues. Overseas Development Institute, London. In Ferroni M. & Mody A. (Eds): *International Public Goods: Incentives, Measurement and Financing*. The Hague: Kluwer Academic.

MORTON A. (2002): A Guide Through the Theory of Knowledge. Malden: Blackwell Publishing. 208 p.

MYERS M.D. (1997): Qualitative research in Information Systems. *MIS quarterly*. 21(2). p. 241-242.

NAHAPIET J. & GHOSHAL S. (1998): Social Capital, Intellectual Capital and the Organizational Advantage. *Academy of Management Review*. 23(2). p. 242-266.

NARDI B. & WHITTAKER S. (2002): The role of face-to-face communication in distributed work. In Hinds P. & Kiesler S. (Eds.) (2002): *Distributed Work: New ways of working across distance using technology*. Cambridge (MA): MIT Press. p. 83-110.

NEEF D. & SIESFELD G. A. & CEFOLA J. (1998): The Economic Impact of Knowledge. Boston: Butterworth-Heinemann. 384 p.

NEWALL P. (2004): Epistemology 1. Available at: http://www.galilean-library.org/manuscript.php?postid=43783 (Last accessed July 8, 2008)

NEWMAN B. (1991): An open discussion of Knowledge Management. What is Knowledge Management? The Knowledge Management Forum. USA. Available at: http://www.kmforum.org/ (Last accessed July 21, 2008)

NGUYEN D. (2008): Ecosystem in Action Interviews. Available at: https://www.sdn.sap.com/irj/sdn/wiki?path=/display/Community/Question+and+Answer+Articles (Last accessed July 20, 2008)

NONAKA I. (1994): A dynamic theory of organizational knowledge creation. *Organization Science.* 5(1). p. 14-47.

NONAKA I. & TAKEUCHI H. (1995): The Knowledge-creating company – How Japanese companies create the dynamics of innovation. Oxford: Oxford University Press. 304 p.

OMG (2006): Business Process Modeling Notation (BPMN 1.0). Open Management Group Final Adopted Specification. Business Process Management Initiative. Available at: http://www.bpmn.org/Documents/OMG%20Final%20Adopted%20BPMN%201-0%20Spec%2006-02-01.pdf (Last accessed June 17, 2008)

ORR J.E. (1996): Talking about machines: an ethnography of a modern job. Itchaca (NY): ILR Press. 172 p.

ORTIZ LAVERDE A.M. & BARAGAÑO A.F. & SARRIEGUI DOMINGUEZ J.M. (2003): Knowledge Processes: On Overview of the Principal Models. Available at: http://www.providersedge.com/docs/km_articles/Knowledge_Processes-An_Overview%20_of_Principal_Models.pdf (Last accessed July 24, 2008)

ORTWEIN E. & SPALLEK P. (1998): Wissensmanagement in der Managementberatung – Praxisbeispiel Arthur D. Little. *IM Information Management & Consulting*. 13(1). p. 105-107.

PALKOVITS S. & WOITSCH R. KARAGIANNIS D. (2003): Process-Based Knowledge Management and Modelling in E-government — An Inevitable Combination. In: Lecture Notes in Computer Science. Berlin: Springer. 614 p.

PEDERSON C.R. (1998): Management of Knowledge New IT 'Craze'. *Computing Canada*. 24(27). p. 19-21.

PELLED L.H. (1996): Demographic Diversity, Conflict, and Work Group Outcomes: An Intervening Process Theory. *Organization Science*. 7(6). p. 615-630.

PERRY C. (1998): A structured approach to presenting theses. Available at http://www.scu.edu.au/schools/gcm/ar/art/cperry.html (Last accessed February 27, 2011)

PFEFFER J. & SUTTON R.I. (2000): The Knowledge-Doing Gap: How Smart Companies Turn Knowledge into Action. Boston: Harvard Business School Press. 314 p.

PHILIPS (2002): Philips Knowledge Management Casebook. 185 p.

PIERCE J. (2002): Intellectual Capital, Social Capital and Communities of Practice. Available at: http://www.providersedge.com/docs/km_articles/Intellectural_Capital_-_Social_Capital_-_CoP.pdf (Last accessed November 12, 2007)

PINDER C. (1998): Work motivation in organizational behaviour. Upper Saddle River (NJ): Prentice Hall. 560 p.

POLÁNYI M. (1964): Personal Knowledge. New York: Harper & Row. 449 p.

POLÁNYI M. (1966): The Tacit Dimension. Garden City (NY): Doubleday. 119 p.

POPPER K.R. (1972): Objective Knowledge. An Evolutionary Approach. Oxford: The Clarendon Press. 395 p.

PORTER A. & READ W. H. (1998): The Information Revolution: Current and Future Consequences. Greenwich (CT): Ablex Publishing Corporation.

PRAHALAD C.K. & HAMEL G. (1990): The core competence of the corporation. *Harvard Business Review*. 68(3). p. 79-91.

PROBST G. & RAUB S. & ROMHARDT K. (1999): Managing Knowledge: Building Blocks for Success. West Sussex: Wiley. 368 p.

PRYOR J. (2004): Theory of Knowledge - The Gettier Problem. Princeton: Princeton University.

PULIC A. (2000): VAIC - An accounting tool for IC management. *International Journal of Technology Management*. 20(5-8). p. 702-714.

RAZA ABIDI S.S. & YU-N C. (2001): A Knowledge Creation Strategy To Enrich Enterprise Information Systems With Enterprise-Specific Tacit Knowledge. ICEIS 2001, Proceedings of the 3rd International Conference on Enterprise Information Systems. Setubal (Portugal). Volume 2. p. 633-638.

REMUS U. (2002): Prozeßorientiertes Wissensmanagement - Konzepte und Modellierung. PhD thesis, Wirtschaftswissenschaftliche Fakultaet der Universitaet Regensburg, Regensburg. Available at: http://www.opus-bayern.de/uni-regensburg/volltexte/2002/80/pdf/remusdiss.pdf (Last accessed July 8, 2008)

REMUS U. & LEHNER F. (2000): The Role of Process-oriented Enterprise Modeling in Designing Process-oriented Knowledge Management Systems. Stanford (CA) AAAI Spring Symposium, 20-22 Mar 2000. In Bringing Knowledge to Business Processes: Papers from 2000 AAAI Spring Symposium. p. 32-36.

RICO R. ET AL. (2008): Team implicit coordination processes: A team knowledge-based approach. *Academy of Management Review*. 33(1). p. 163-184.

RIOUX K. (2000): Sharing information found for others on the Web: a preliminary examination. In Kraft D. (Ed.): Proceedings of the 63rd Annual Meeting of the American Society for Information Science. Medford (NJ): Information Today. Vol. 37. p. 68-77.

ROBERTSON M. & SØRENSEN C. & SWAN J. (2000): Managing Knowledge With Groupware: A Case Study of a Knowledge-Intensive Firm. In Proceedings of the 33rd Hawaii International Conference on System Sciences (HICSS-33). Maui (HI)

ROMER P. (1990): Endogenous Technological Change. *Journal of Political Economy*. 98(5). p. 71-102.

ROOS G. ET AL. (1998): Intellectual capital: navigating in the new business landscape. New York (NY): New York University Press. 143. p.

ROUTIO P. (2007): Models in the Research Process. Available at: http://www2.uiah.fi/projects/metodi/177.htm (Last accessed February 27, 2011)

ROWLEY J. (2007): The wisdom hierarchy: representations of the DIKW hierarchy. *Journal of Information Science*. 33(2) 2007. p. 163–180.

RYAN R.M. & DECI E.L. (2000): Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*. 55(1). p. 68-78.

SAP (2003): EP KM Overview. Available at: http://service.sap.com (Last accessed November 2, 2006)

SAP (2004): Community Brief. Available at: http://sdn.sap.com (Last accessed June 12, 2006)

SAP (2007a): SAP Customer Success Story. High Tech – Business Software. SAP AG. Available at: http://download.sap.com/platform/netweaver/customersuccess/download.epd?context=34551C25A8C761AAAF61E2D8988633AEE1D2622ACDDE30D91CE7BCF466539CD4332589187D5BF26E07F88111971259AAE8570CAE5C9FB910 (Last accessed July 1, 2008)

SAP (2007b): Community Day at a Glance. Available at: https://www.sdn.sap.com/irj/sdn/communityday (Last accessed July 2, 2008)

SAP (2008): The Power of Community. Communities of Innovation at SAP: Public Sector Examples. Available at: http://download.sap.com/platform/esoa/brochures/download.epd?context=7249E6132A3714D312D3127693174ACFF30CF64BAAD60290210973A4F34E2DC0F384B617ECBEA6CF7ED8F61743A6EE094266FBD169CF626F (Last accessed July 1, 2008)

SAP (2008b): SAP Expands Scope of Annual SAP TechEd Events to Address Unprecedented Ecosystem Growth. Available at: http://www.sap.com/about/newsroom/press.epx?PressID=9989 (Last accessed March 28, 2010)

SAP (2010): Business in Brief. Available at: http://www.sap.com/about/investor/inbrief/solutions/index.epx (Last accessed March 28, 2010)

SAROIU S. & GUMMADI P.K. & GRIBBLE S.D. (2002): A measurement study of peer-to-peer file sharing systems. In Proceedings of Multimedia Computing and Networking (MMCN) January 2002.

SAWYER S. & ESCHENFELDER K. & HECKMAN R. (2000): Knowledge markets: cooperation among distributed technical specialists. In Srikantaiah T. & Koenig

M. (Eds.): Knowledge management for the information professional. Medford (NJ): Information Today. p. 181-204.

SCHÖN D. A. (1983): The Reflective Practitioner. London: Basic Books. 384 p.

SCHUMPETER J.A. (1934): The Theory of Economic Development. An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle. Cambridge (MA): Harvard University Press. 267 p.

SCHUTT R. K. (2006): Investigating the Social World: The Process and Practice of Research. Thousand Oaks (CA): Pine Forge Press. 5th edition. 680 p.

SCHWANDT M. & GAFNI E. (2003): SAP Developer Network. SAP. Available at: https://www.sdn.sap.com/irj/sdn/go/portal/prtroot/docs/library/uuid/96d2ba90-0201-0010-78a4-c5e31148a2dd (Last accessed May 21, 2008)

SENGE P. (1990): The Fifth Discipline, The Art and Practice of the Learning Organization. New York: Doubleday. 371 p.

SHANNON C.E. & WEAVER W. (1949): The mathematical theory of communication. Urbana: University of Illinois Press. 144 p.

SHARMA N. (2008): The Origin of the Data Information Knowledge Wisdom Hierarchy. Available at: http://www-personal.si.umich.edu/~nsharma/dikw_origin.htm (Last accessed July 8, 2008)

SHRIVASTAVA P. (1983): A typology of organizational learning systems. *Journal of Management Studies.* 20(1). p. 7-28.

SCHUMPETER J. A. (1939): Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process. New York: McGraw Hill. Vol. I and II.

SHIH C.W. (2008): Conflict, Communication, and Performance in IS Developing Team. Available at: http://thesis.lib.ncu.edu.tw/ETD-db/ETD-search/view_etd?URN=89443005#anchor (Last accessed April 2, 2011)

SIMON H. (1957): A Behavioral Model of Rational Choice. In: Models of Man, Social and Rational: Mathematical Essays on Rational Human Behavior in a Social Setting. New York: Wiley. 287 p.

SKYRME D. J. (2001): Capitalizing on Knowledge – From e-business to k-business. Oxford: Butterworth-Heinemann. 280 p.

SMITH H. A. & MCKEEN, J. D. (2001): Instilling a Knowledge-sharing Culture. Queens University School of Business. Ontario: Queen's Centre for Knowledge-based Enterprises. WP 03-11. Available at:

http://business.queensu.ca/centres/monieson/docs/working/working_03-11.pdf (Last accessed July 8, 2008)

SMITH M.K. (2003): Michael Polanyi and tacit knowledge. The encyclopedia of informal education. Available at: http://www.infed.org/thinkers/polanyi.htm (Last accessed July 8, 2008)

SNOEREN S. (2009): Coordination and Knowledge Transfer within Teams. Research project at Rotterdam School of Management, Erasmus Universiteit Rotterdam. BIC, T4-50

SOCHAN M. (2004): The SAP Developer Network: Great Dog Food! SAP Insider. Wellesley Information Services. Available at: https://www.sdn.sap.com/irj/sdn/go/portal/prtroot/docs/library/uuid/6f5ac990-0201-0010-0fab-9f3c8dffd3ac (Last accessed May 21, 2008)

SOMERVILLE K. (2001): The Role of Organizational Culture in Knowledge Organizations. Available at: http://www.hc-sc.gc.ca/iacb-dgiac/km-gs/english/kmhome.html (Last accessed May 5, 2007)

SOUSA M. (2008): Open innovation models and the role of knowledge brokers. Inside Knowledge Magazine. Available at: http://www.openinnovatie.nl/download/LowResIKMarch08Case%20Study.pdf (Last accessed May 29, 2010)

SPEK S. (2008): Knowledge management by wikis. Available at: http://www.cs.unimaas.nl/s.spek/wikiposition.pdf (Last accessed May 10, 2008)

SRINIVAS H. (1999): Leadership in the Information Age. Available at: http://www.gdrc.org/info-design/info-age/sld004.htm (Last accessed March 28, 2010)

STALLKAMP M. & HANKE T. (2003): Knowledge Sharing: Identifying the Best Practice by Benchmarking. In: Abramowicz W. & Gary K. (Eds.): *Business Information Systems*. Proceedings of BIS 2003. Colorado Springs (USA). p. 162–165.

STEBBINS R. A. (2001): Exploratory Research in the Social Sciences. Sage University Papers on Qualitative Research Methods. Vol. 48. Thousand Oaks (CA): Sage Publications. 80 p.

STROHMAIER M. (2003): A Business Process Oriented Approach for the Identification and Support of Organizational Knowledge Processes. In 4. Oldenburger Fachtagung Wissensmanagement, Potenziale - Konzepte - Werkzeuge. Germany

STROHMAIER M.B. (2005): B-KIDE: A Framework and a Tool for Business Process Oriented Knowledge Infrastructure Development. PhD Thesis. Institute for Knowledge Management and Knowledge Visualization. Graz: Shaker Verlag. 208 p.

SULLIVAN M. (2005): Four Systems To Describe Human Motives. *UCLA College Report*. Volume 3. Available at: http://www.sscnet.ucla.edu/anthro/faculty/fiske/pubs/UCLA_College_Report_4_Systems_2005.pdf (Last accessed April 5, 2008)

SVEIBY K.E. (1992): Strategy formulation in knowledge-intensive industries. In Hussey D.E. (Ed.): *International Review of Strategic Management*. John Wiley & Sons Ltd. Vol. 3. Available at: http://www.sveiby.com/Portals/0/articles/ManagingKnowHow.pdf (Last accessed April 12, 2008)

SVEIBY K.E. (1997): The New Organizational Wealth: Managing and Measuring Knowledge Based Assets. San Francisco, CA: Berrett Koehler. 220. p.

SWEDBORG R. ed. (1994): Notes in Economics and Sociology. Princeton (NJ): Princeton University Press.

SZULANSKI G. (2000): The process of knowledge transfer. *Organizational Behavior and Human Decision Processes.* 82(1). p. 9-27.

TABIJE I.D. (2007): Knowledge Management - An Evolving Discipline. Available at: http://www.knowledgemanagementnews.com/knowledgemanagementnews-87-20070110KnowledgeManagementAnEvolvingDiscipline.html (Last accessed February 10, 2008)

TEECE D.J. & PISANO G. & SHUEN A. (1997): Dynamic capabilities and strategic management. *Strategic Management Journal.* 18(7). p. 509-533.

TELEOS (2006): 2006 Global Most Admired Knowledge Enterprises (MAKE) Report. Available at: http://www.knowledgebusiness.com/knowledgebusiness/templates/Catindex.aspx?siteId=1&menuItemId=28 (Last accessed June 30, 2008)

TOBIN J. (1969): A general equilibrium approach to monetary theory. *Journal of Money Credit and Banking*. 1(1). p. 15-29.

TSAI W.P. & GHOSHAL S. (1998): Social capital and value creation: the role of intrafirm networks. *Academy of Management Journal.* 41(4). p. 462-476.

TUOMI I. (1999): Data is More Than Knowledge: Implications of the Reversed Hierarchy for Knowledge Management and Organizational Memory. In: Proceedings of the Thirty-Second Hawaii International Conference on Systems Sciences. Los Alamitos (CA): IEEE Computer Society Press. 1071 p.

VROOM V.H. (1964): Work and motivation. New York: Wiley. 331 p.

WALSH J.P. & UNGSON G.R. (1991): Organizational memory. *Academy of Management Review*. 16(1). p. 57-91.

WALSH J.P. (1995): Managerial and organizational cognition: notes from a trip down memory lane. *Organization Science*. 6(3). p. 280-321.

WALSHAM G. (1995): Interpretive case studies in IS research. Nature and method. *European Journal of Information Systems*. 4(2). p. 74-81.

WASKO M.M. & FARAJ S. (2000): It is what one does: why people participate and help others in electronic communities of practice. *Journal of Strategic Information Systems*. 9(1). p. 155-173.

WEINBERGER D. (2010): The Problem with the Data-Information-Knowledge-Wisdom Hierarchy. Available at: http://blogs.hbr.org/cs/2010/02/data_is_to_info_as_info_is_not.html (Last accessed May 13, 2010)

WEINER J. (2011): 100 million members and counting… Available at: http://blog.linkedin.com/2011/03/22/linkedin-100-million/ (Last accessed April 7, 2011)

WEISS C.H. & BUCUVALA M. J. (1980): Social science research and decision-making. New York: Columbia University Press. 332 p.

WENGER E. (1998): Communities of practice: learning, meaning and identity. Cambridge (MA): Cambridge University Press. 336 p.

WENGER E. & MCDERMOTT R. & SNYDER W.M. (2002): Cultivating Communities of Practice. Boston (MA): Harvard Business School Press. 304 p.

WHATIS (2008): Mashup. Available at: http://whatis.techtarget.com/definition/0,,sid9_gci1167147,00.html (Last accessed May 6, 2008)

WHITE R. & ROTH R. A. (2009): Exploratory search: beyond the query-response paradigm. San Rafael (CA): Morgan & Claypool Publishers. 98 p.

WHITTAKER S. & FROHLICH D. & DALY-JONES O. (1994): Informal Workplace Communication: What is it like and how might we support it?, In Proceedings of CHI94-4/94, Boston (MA).

WIIG K.M. (1993): Knowledge Management Foundations: Thinking About Thinking – How People and Organizations Create, Represent, and Use Knowledge. Arlington (TX): Schema Press. 475 p.

WILLIAMSON T. (2000): Knowledge and Its Limits. Oxford: Oxford University Press. 352 p.

WILSON, T.D. (2002): The nonsense of "knowledge management". Information Research. 8(1). Paper #144. Available at: http://informationr.net/ir/8-1/paper144.html (Last accessed July 24, 2008)

WOITSCH R. & KARAGIANNIS D. (2003): Process-oriented knowledge management systems based on KM-services: the PROMOTE® approach. *Intelligent Systems in Accounting, Finance & Management*. 11(4). p. 253-267.

WORD J. (2003): SAP Developer Network. SAP. Available at: https://www.sdn.sap.com/irj/sdn/go/portal/prtroot/docs/library/uuid/04d8ba90-0201-0010-c096-9d18456e3112 (Last accessed May 21, 2008)

WORK FRONTIERS INTERNATIONAL (1999): Knowledge Sharing Culture & Communities. Available at: http://www.workfrontiers.com (Last accessed September 24, 2007)

WORKFLOW RESEARCH (2003): Visio Templates for BPMN. Available at: http://workflow-research.de/Downloads/BPMN/ (Last accessed Jan 12, 2008)

World Bank (2009): Measuring Knowledge In The World's Economies. p. 12. Available at: http://acrossworld.com/wp-content/uploads/Measuring_Knowledge_K4D.pdf (Last accessed May 25, 2010)

XENIKOU A. & FURNHAM A. (1996): A Correlational and Factor Analytic Study of Four Questionnaire Measures of Organizational Culture. *Human Relations*. 49(3). p. 349-371.

YAMAMOTO H. & OHTA T. (2001): Development of a knowledge market based on reputation, and absorption of uncertainty in electronic commerce. In: Proceedings of the 5th World Multiconference on Systemics, Cybernetics and Informatics. Vol. VIII. p. 394-399.

YIN R.K. (1989): Case study research: Design and methods. Newbury Park (CA): Sage. 200 p.

YOLTON M. (2007): Reply to a question in the "Free TechEd and Community Day Tickets for Top Contributors" forum. Available at: https://www.sdn.sap.com/irj/sdn/weblogs?blog=/pub/wlg/6729 (Last accessed July 19, 2008)

YOO Y. & GINZBERG M. (2003): One Size Doesn't Fit All: Knowledge Management Systems and Knowledge Sharing Practices in Global Learning Organizations. Sprouts: Working Papers on Information Environments, Systems and Organizations. 3(2). p. 83-106. Available at: http://sprouts.case.edu/2003/030204.pdf (Last accessed May 10, 2008)

ZAINA Z. (2007): Case study as a research method. *Jurnal Kemanusiaan*. (9). p. 1-6.

ZELDIN T. (1998): Conversation: How talk can change our lives. London: Harville Press. Available at: http://www.gurteen.com/gurteen/gurteen.nsf/id/X0002CCE2/ (Last accessed February 22, 2007)

ZIKMUND W. G. (2003). Business research methods. Boston (MA): Harcourt College Publishers. 660 p.

ZOOK M.A. (2004): The knowledge brokers: venture capitalists, tacit knowledge and regional development. *International Journal of Urban and Regional Research*. 28(3). p. 621–641.

8.2 APPENDIX 2: Knowledge Sharing based on the RMT

Boer & van Baalen & Kumar summarized how the four models of the Relational Models Theory can be applied to knowledge sharing. (2004, p. 22.)

	Communal Sharing	Authority Ranking	Equality Matching	Market Pricing
How is knowledge being perceived?	As a common resource, rather than as one individual's property. Knowledge is not "marked".	As a means to display one's superiority. "Knowledge is power."	As a means of exchange for other knowledge.	As a commodity which has a value and can be traded.
What are the implications of this perception for the knowledge sharing process?	Knowledge is freely shared among people belonging to the same group. "What is mine is yours."	By sharing knowledge one can demonstrate one's nobility and largesse. The higher a person's rank, the better access to better knowledge.	The knowledge sharing process becomes dependent on similar knowledge sharing processes from the past or in the future.	The knowledge sharing process becomes dependent on the value of the knowledge.

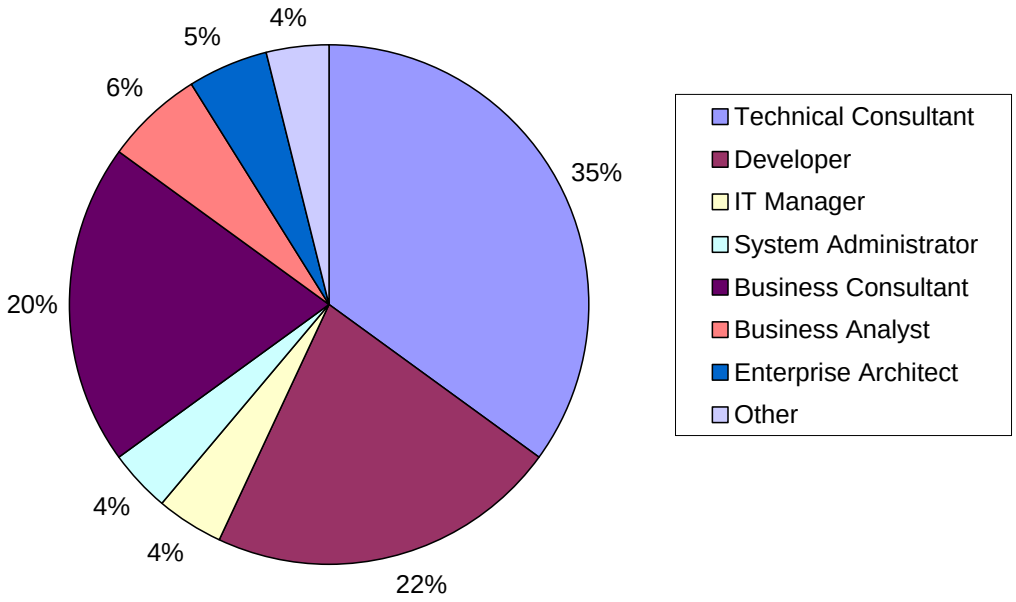
	Communal Sharing	Authority Ranking	Equality Matching	Market Pricing
Why is knowledge being shared? (push vs. pull)	Because one thinks that someone else might need it; because someone asks for it; intimacy motivation.	Because it is requested by someone of a higher rank; because the superior has to share it. Power motivation.	Because someone else has shared something similar before; because one expects something in return. Desire for equality	Because one receives a compensation for it. (not something similar) Achievement motivation.
When might knowledge not being shared even though it is desirable?	When one is not capable of sharing it or when the desirability is unknown.	When it can change the balance of power.	When nothing similar can be shared in return within a reasonable time span.	When the perceived compensation is not high enough.
What are the hidden motives for (not) sharing knowledge?	No hidden motives.	"Negative" knowledge is withheld; window dressing. Knowledge overload may originate from largesse and sweet-talk.	By sharing knowledge with someone, one can morally obliged this person to share something in return.	By sharing knowledge below its market value, one might create moral commitment.
How are problems resulting from knowledge sharing solved?	By seeking consensus.	By authoritative fiat.	By "one person, one vote".	By rational cost-benefit analysis.

	Communal Sharing	Authority Ranking	Equality Matching	Market Pricing
By who is knowledge being shared?	By kinship, minimal groups, national identities (knowledge is obviously not being shared with outsiders)	By people with different hierarchical positions (ranks).	By people at the same horizontal or vertical position in the division of labor.	By the people who receive and provide the compensation.
With what emotion is knowledge being shared?	It goes without saying, based on idealism.	Mostly not spontaneous but based on sense of duty.	Unproblematic as long as the time span between the return is not too long.	Unproblematic as long as the compensation is appropriate.
What moment is knowledge being shared?	Any time when needed.	Immediately when the superior requests it and otherwise when one has time.	When there is a (potential) mismatch in sharing.	When the compensation is high enough.
How is knowledge being shared?	Various ways, but in a personal way.	Various ways (brief and short).	In a similar way as before or as expected in future.	In the way it is demanded.
Examples of knowledge that is typically being shared?	In principle everything.	Factual knowledge.	Personal background knowledge.	Functional expertise.

8.3 APPENDIX 3: SCN research data analysis

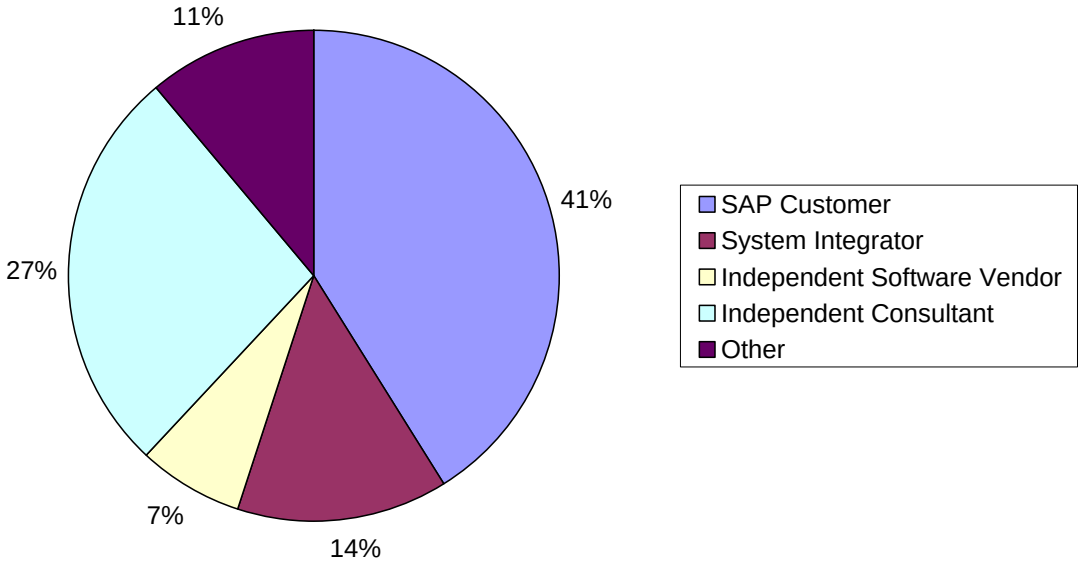
Functional area	Research method	Conclusion
Forum	participant observation text analysis narratives survey	CS, EM, AR, MP
Wiki	participant observation text analysis	CS, EM, AR, MP
Blog	participant observation text analysis narratives	CS, AR
Library	participant observation text analysis	EM, AR
Chat	participant observation text analysis	CS, EM, AR
Mentor program	participant observation text analysis narratives	CS, AR
Premium Access Zone	participant observation text analysis	MP
Community Day (offline spin-off)	text analysis narratives	CS, AR
Points-recognition system	participant observation text analysis narratives survey	AR, MP

8.4 APPENDIX 4: SDN member statistics



Distribution of members by role

(Source: Elliott 2007a)



Distribution of members by affiliation to SAP

(Source: Blich 2006)

8.5 APPENDIX 5: Distinct correction cases

In the case of Intenzz SAP Consulting Group, in the analysis of the online survey results, when option 5 was selected and the text entered did clearly correspond to one of the four models, a correction was made. This appendix lists these corrections.

CC01: The participant entered “it would stop for a while when the project(s) takes up a lot of time and effort”. The person is ready to share unlimited time, provided a bottleneck is not reached; therefore the correction can be 1 (CS).

CC02: The participant entered “if nobody would ever read it”. The person is ready to share unlimited time as long somebody is willing to read; therefore the correction can be 1 (CS).

CC03: The participant entered “fun discussing different views”. Having fun is a core benefit in CS while it is not a core benefit in the other models; therefore the correction can be 1 (CS).

CC04: The participant entered “If I would not feel connected to the function group”. Being connected to the group is CS; therefore the correction can be 1 (CS).

CC05: The participant entered “if I had the feeling that it is not appreciated”. Being appreciated is a typical AR benefit; therefore the correction can be 2 (AR).

CC06: The participant entered “improved proposal/offering”. Improved proposal leads to profitable projects; therefore the correction can be 4 (MP).

CC07: The participant entered “improve overall quality of service from the company I work for”. This offers no direct benefit for the individual only for the company; therefore the correction can be 1 (CS).

CC08: The participant entered “If people take the credit for it”. This is asocial behavior, as defined by Fiske (1991); therefore we cannot just assign a correction to it. This is outside the Relational Models Theory. This value will not be usable for the calculations.

CC09: The participant entered “increased knowledge at customer, simplifying future work”. The benefit for the consultant is saving time. Time is money; therefore the correction can be 4 (MP).

CC10: The participant entered “I would not like sharing knowledge anymore if it was highly formalized (requested by manager / channeled in training-sessions /

structured in procedures). As long as sharing knowledge can be done in an informal natural way it is one of the more satisfying things to do." Having satisfaction as the main benefit in knowledge sharing indicates CS; therefore the correction can be 1 (CS).

CC11: The participant entered "help Intenzz". The main benefits are not for the individual who is sharing knowledge; therefore the correction can be 1 (CS).

CC12: The participant entered "I would not like sharing knowledge anymore if it was highly formalized (requested by manager / channeled in training-sessions / structured in procedures). As long as sharing knowledge can be done in an informal, natural way it is one of the more satisfying things to do." Having satisfaction as the main benefit in knowledge sharing indicates CS; therefore the correction can be 1 (CS).

CC13: The participant entered "I cannot think of one good reason to stop sharing knowledge in this informal way on projects. I will always try to share knowledge this way with almost anyone." What the participant describes here is sharing without limits; therefore the correction can be 1 (CS).

CC14: The participant entered "to inform people and to get feedback on that information". Sharing to get feedback is a give and take relationship; therefore the correction can be 3 (EM).

CC15: The participant entered "when the return on sharing is negligible". This is expecting return on sharing; therefore the correction can be 3 (EM).

CC16: The participant entered "to gain information or when it is necessary to document your accomplishments". Sharing is done because it is required; therefore the correction can be 2 (AR).

CC17: The participant entered "end of assignment". It means that sharing is stopped when it is not paid; therefore the correction can be 4 (MP).

CC18: The participant entered "next to respect, loyalty, authority, and similar knowledge, it also helps someone further in a project". Respect and authority indicates AR; therefore the correction can be 4 (MP).

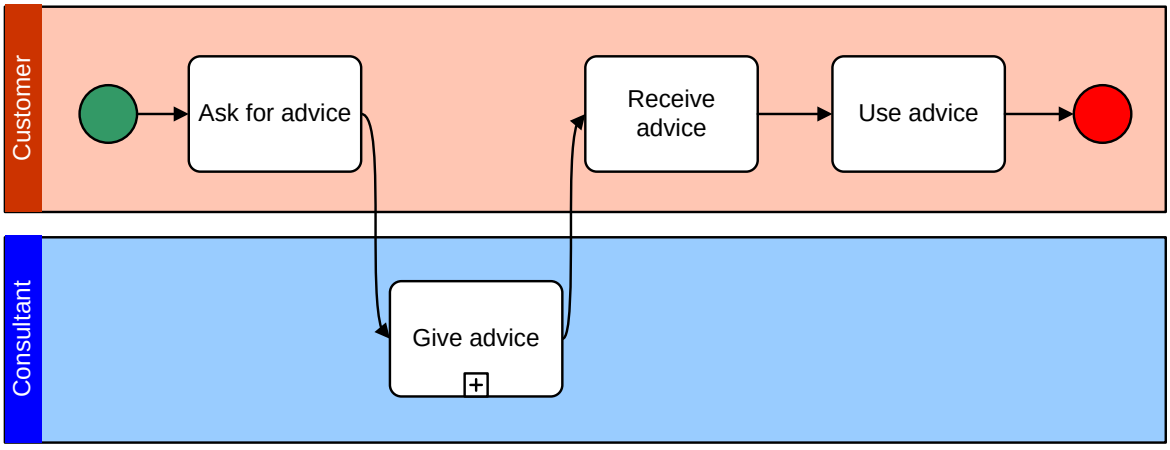
CC19: The participant entered "I would stop if sharing could harm my or Intenzz' position". The person is ready to share unlimited provided it is not in conflict with his job; therefore the correction can be 1 (CS).

8.6 APPENDIX 6: Business and Knowledge Process Models

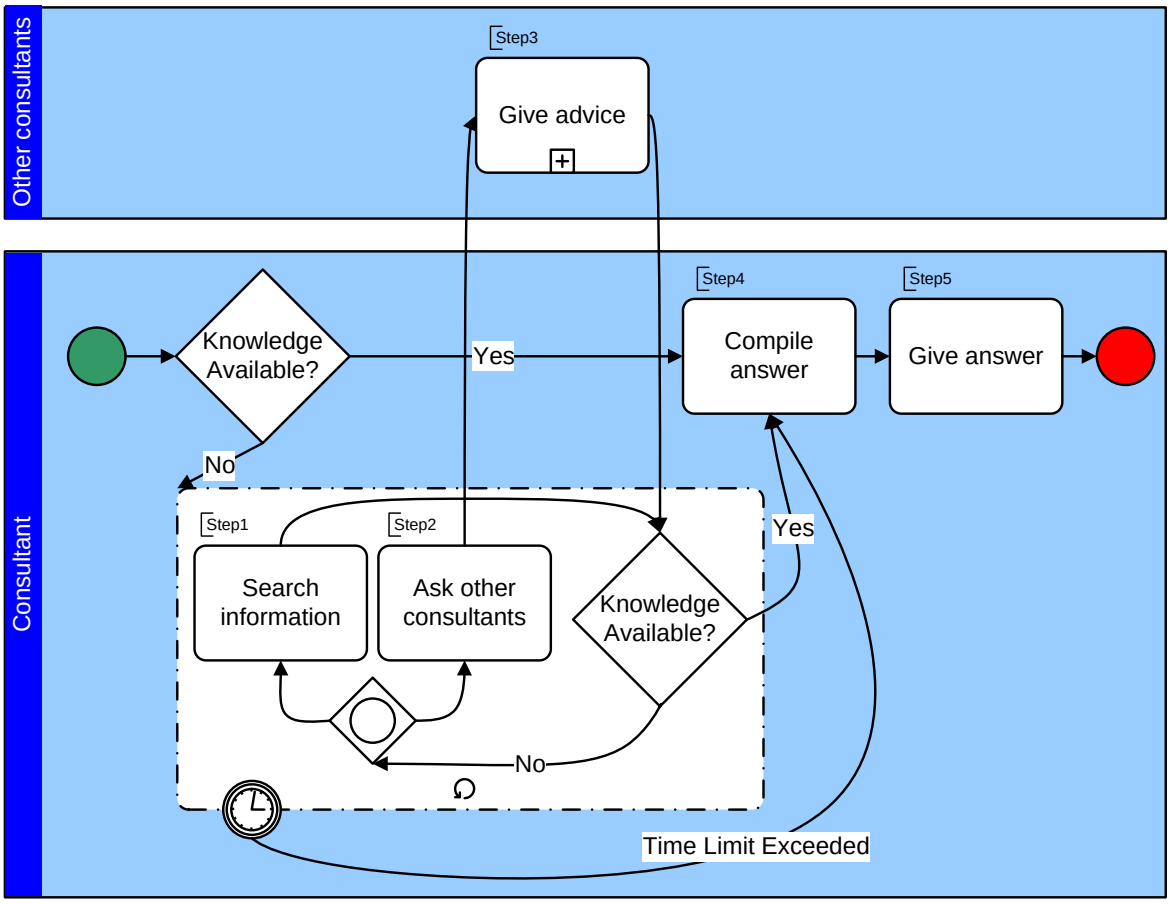
BP1: Consulting the customer

In BP01 the customer asks for some advice, the consultant gives advice, the customer receives the advice and eventually the customer will make use of the advice. This is the fundamental process in a consulting firm. Consultants do their daily work at customers' offices, they help the customer to achieve their business goals and in exchange, the consulting firm gets paid (and the company pays the consultant). In this business process, giving advice is a subprocess, which can be expanded as a knowledge process (KP01). In the knowledge process the consultant him/herself communicates with other Intenzz consultants. If the given consultant does not have enough knowledge, she/he will search for information (Step1), ask other consultants (Step2), and other consultants will help (Step3). These steps will be repeated until a certain time limit (usually set by the customer) is reached and then she/he will compile the answer from all the various information collected (Step4), and eventually give the answer (Step5). Step2, 3, and 5 are in focus to analyze knowledge sharing.

Business process:



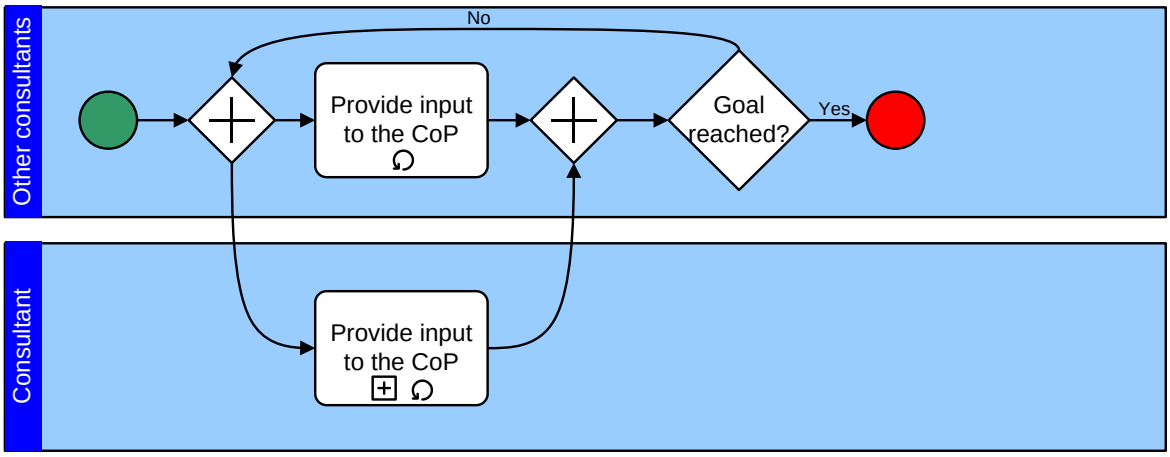
Knowledge process:



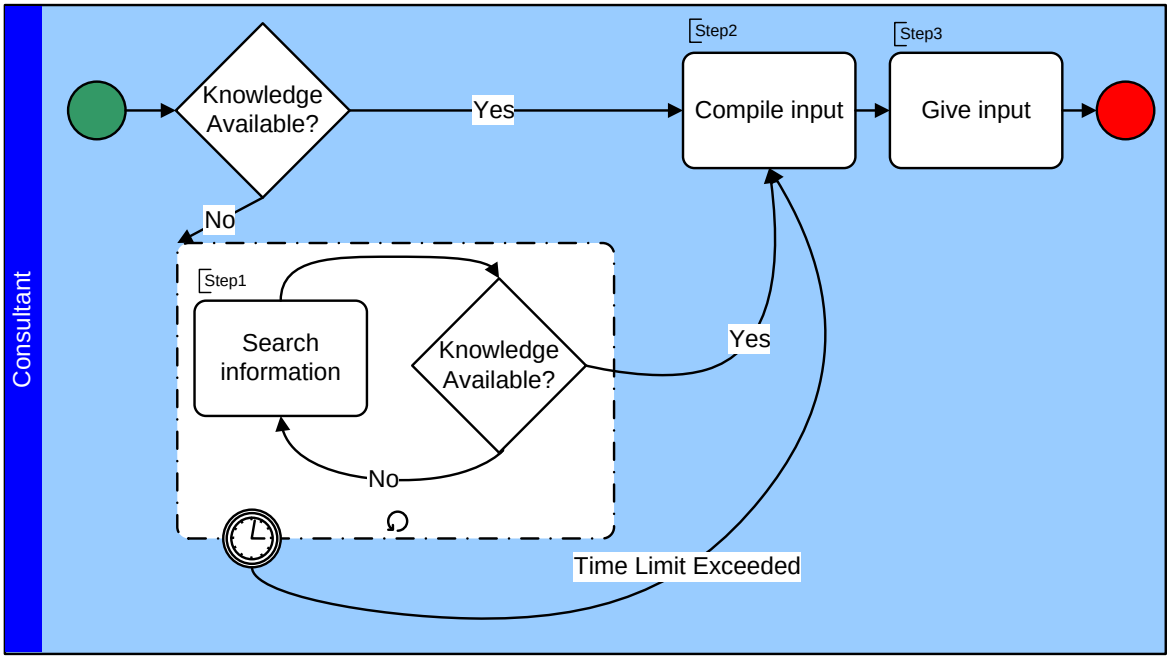
BP2: Working in teams

In BP02 one given consultant provides input just like the other consultants until the goal has been reached. In this business process, providing input is a subprocess, which can be expanded as a knowledge process (KP02). This knowledge process is similar to KP01, the difference is that the knowledge is compiled only from findings of the given consultant, without the involvement of others. In this knowledge process only Step3 (Giving input) is in focus to analyze knowledge sharing.

Business process:



Knowledge process:

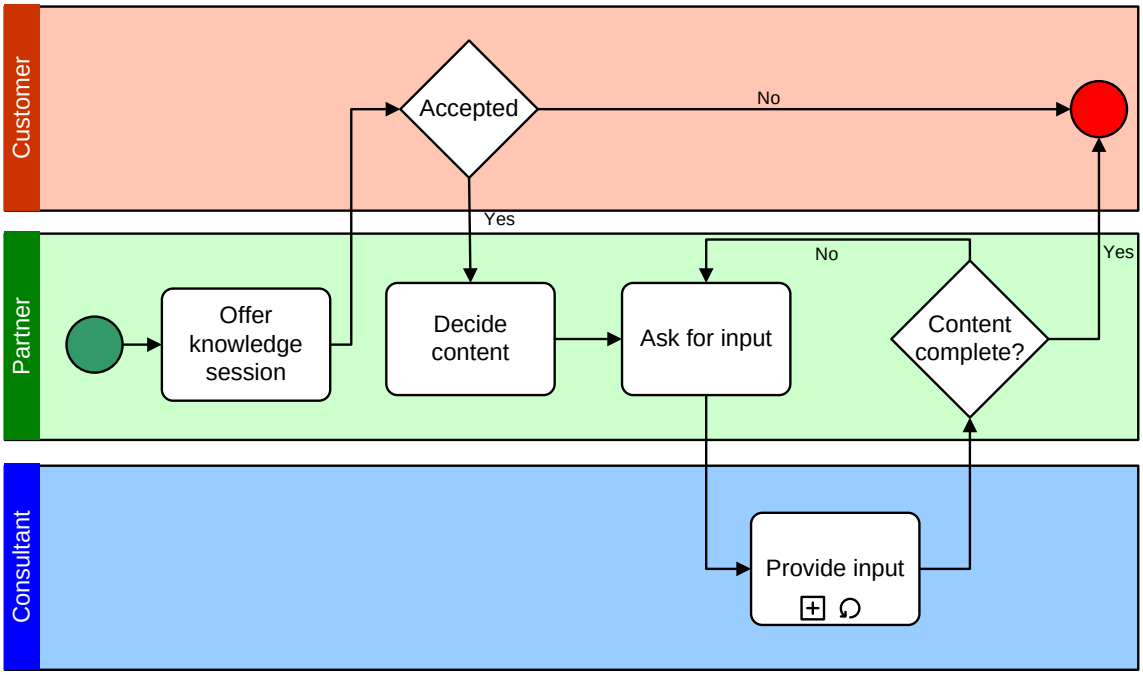


BP3: Preparing a knowledge session for a customer

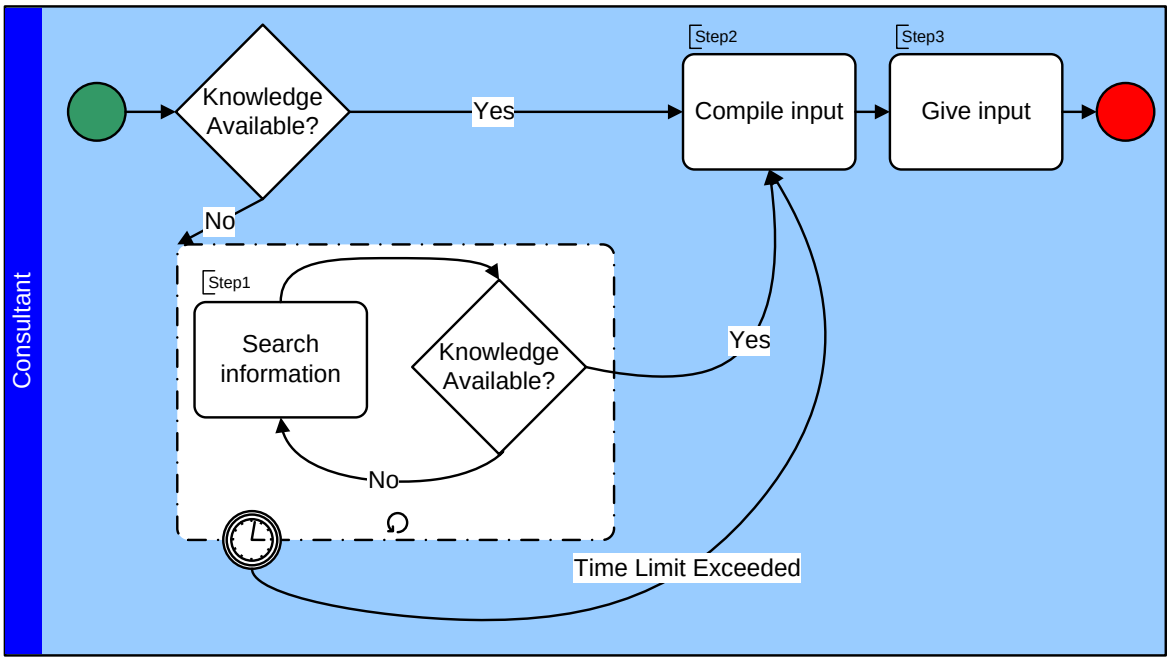
In BP03 an Intenzz partner offers the knowledge session to the customer. If the customer indicates interest, then the partner, based on the interest, decides on the content of the session. The partner asks for input from the consultants and once enough input has been gathered, the session is prepared. Knowledge sessions are organized in order to support sales. It is generally difficult for a young consulting company to gain visibility and get known among SAP customers. Therefore such sessions are organized to give a good

impression to one or more customers in a session. This is basically knowledge sharing with the customers without directly getting paid. It is part of pre-sales. In this business process, providing input is a subprocess, which can be expanded as a knowledge process (KP03). This knowledge process is the same as KP02; therefore only Step3 (Giving input) is in focus to analyze knowledge sharing.

Business process:



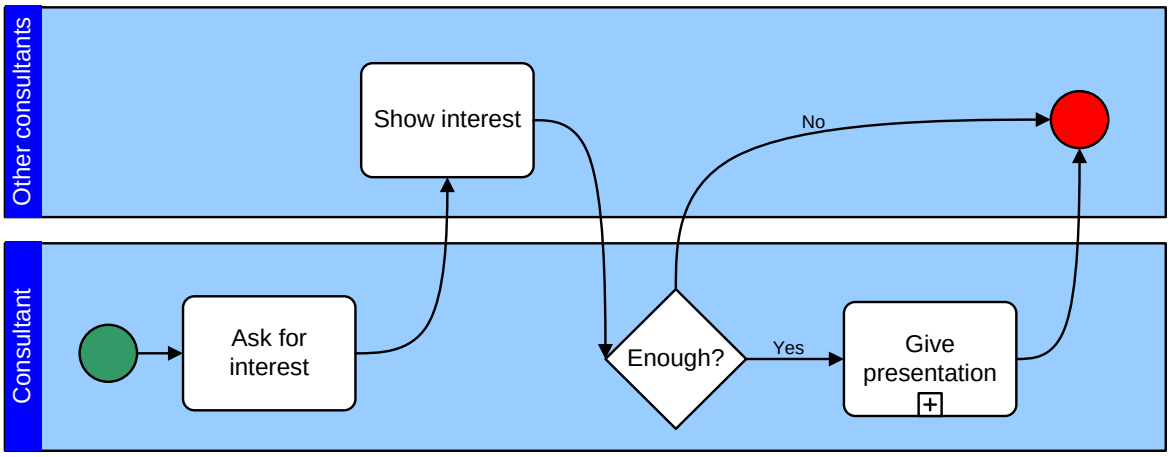
Knowledge process:



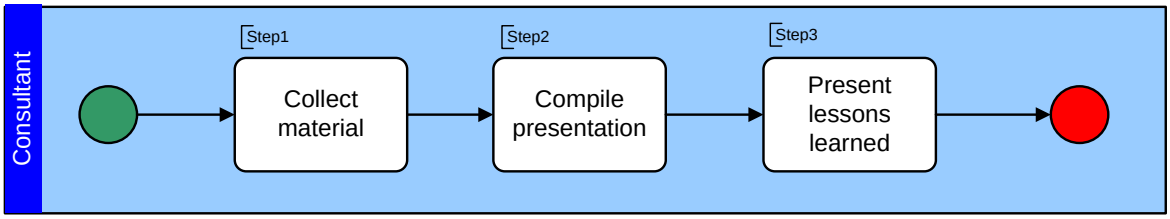
BP4: Sharing lessons learned from a training session

In BP04 after the given consultant has completed a (mostly SAP) training, she/he asks other consultants if they are interested to hear what she/he learned from the training. In case of enough interest, the given consultant gives a presentation to the others. Given that the average price of SAP trainings is around €500 per day, it makes a lot of sense for the company if not all employees follow the same training, but divide themselves and cover several training topics. This only works if consultants share what they learned with each other. In this business process, giving presentation is a subprocess, which can be expanded as a knowledge process (KP04). First the consultant collects material suitable for the training (Step1), then compiles the material (Step2), and finally presents it to the others (Step3). Step3 (Present lessons learned) is the actual sharing of knowledge; therefore it is in focus to analyze knowledge sharing.

Business process:



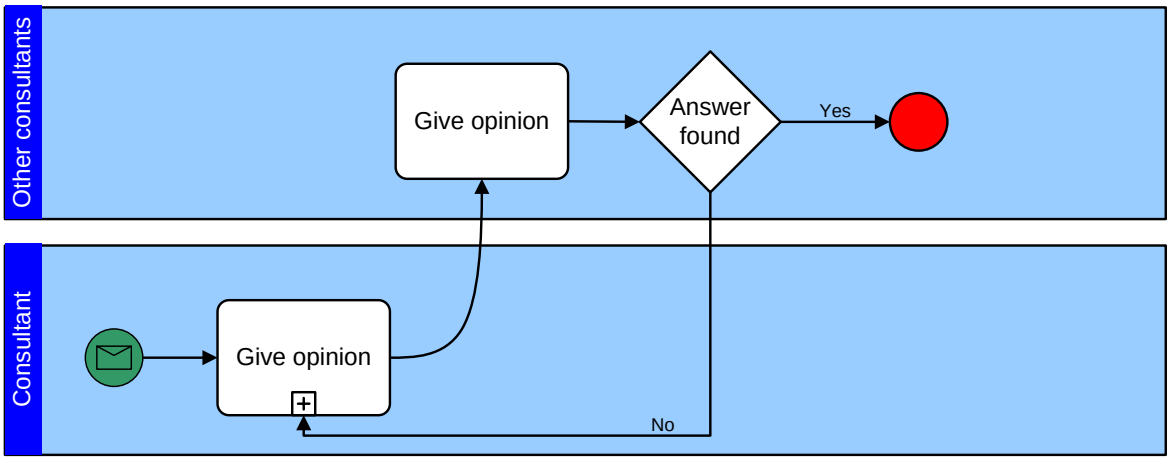
Knowledge process:



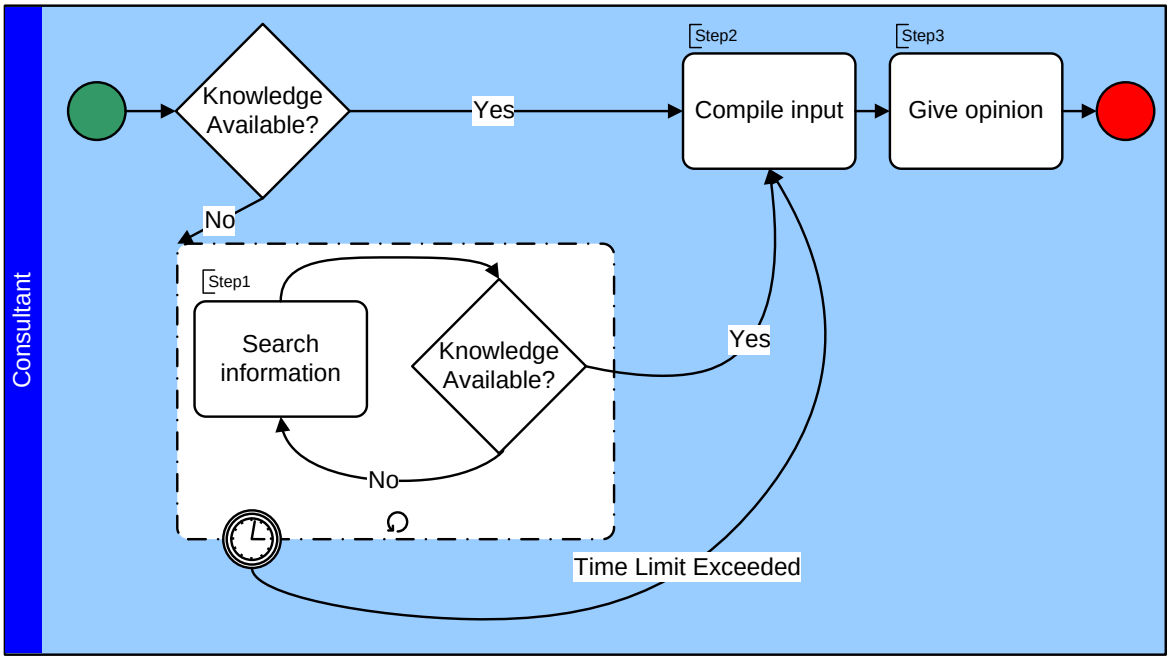
BP5: Discussing a topic in email/IM

In BP05 the trigger comes in the form of a question in an email. The given consultant gives an opinion/answer to the question, then other consultants also give an opinion and this iteration goes on until an answer or some kind of answer is found. Email and Instant Messaging are typical communication channels for this kind of discussions, because the consultants are dispersed among multiple projects around the country. Whatever project they are working on, in whatever location, there is always the opportunity to discuss SAP-related topics with colleagues in this way. In this business process, giving opinion is a subprocess, which can be expanded as a knowledge process (KP05). This knowledge process is the same as KP02; therefore only Step3 (Giving input) is in focus to analyze knowledge sharing.

Business process:



Knowledge process:

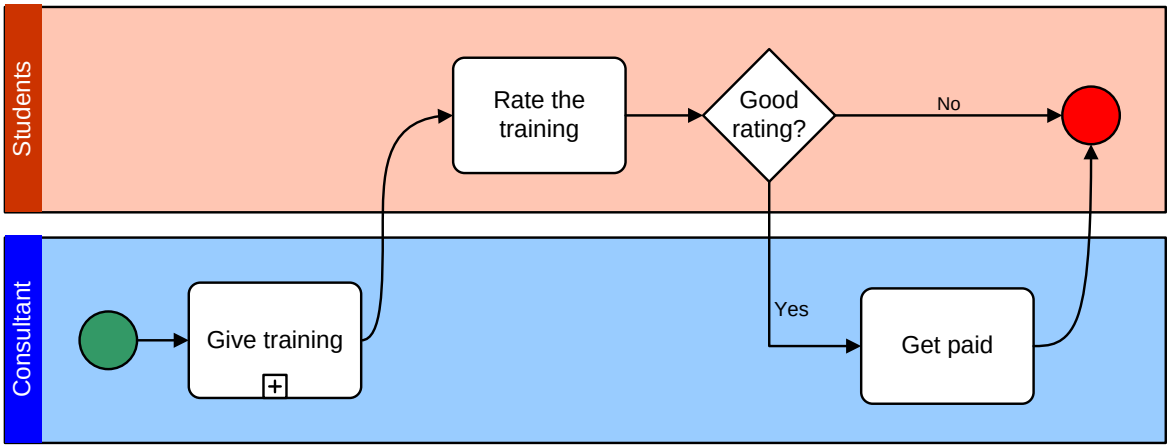


BP6: Giving SAP trainings

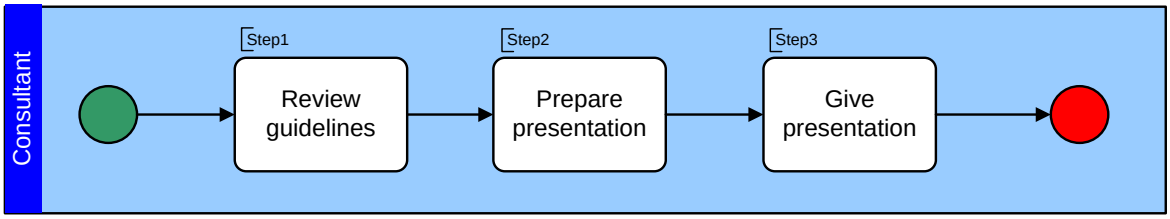
In BP06 the given Intenzz consultant trains non-Intenzz consultants. SAP itself is not only a software house, but also a large educational center as well. SAP offers thousands of training topics about all aspects of its software around the world in many languages. This is a huge business in itself. Since there is a shortage of experienced trainers who have knowledge of the subject matter, and also have completed multiple projects; therefore have real-life experience, SAP asks partners to provide trainers and act as SAP trainers at the

SAP training facilities. Intenzz consultants take part in this system. When they train others, basically they train junior consultants of the competition. At the end of the trainings the students can rate the trainer and if the rating is below 80%, the trainer does not get paid at all. SAP thereby tries to ensure quality. In this business process an Intenzz consultant trains the other consultants, i.e., the students, rate the training, and if the rating is good enough, the Intenzz consultant gets paid. Giving training is a subprocess, which can be expanded as a knowledge process (KP06). First the consultant reviews the training guidelines provided by SAP (Step1), then prepares the presentation (Step2), and finally gives the presentation (Step3). Step3 is the actual sharing of knowledge; therefore it is in focus to analyze knowledge sharing.

Business process:



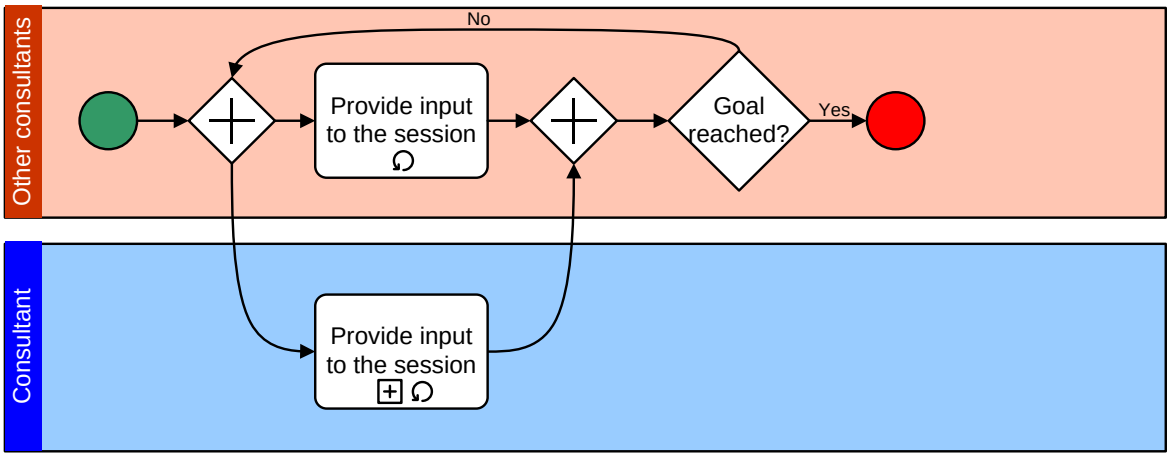
Knowledge process:



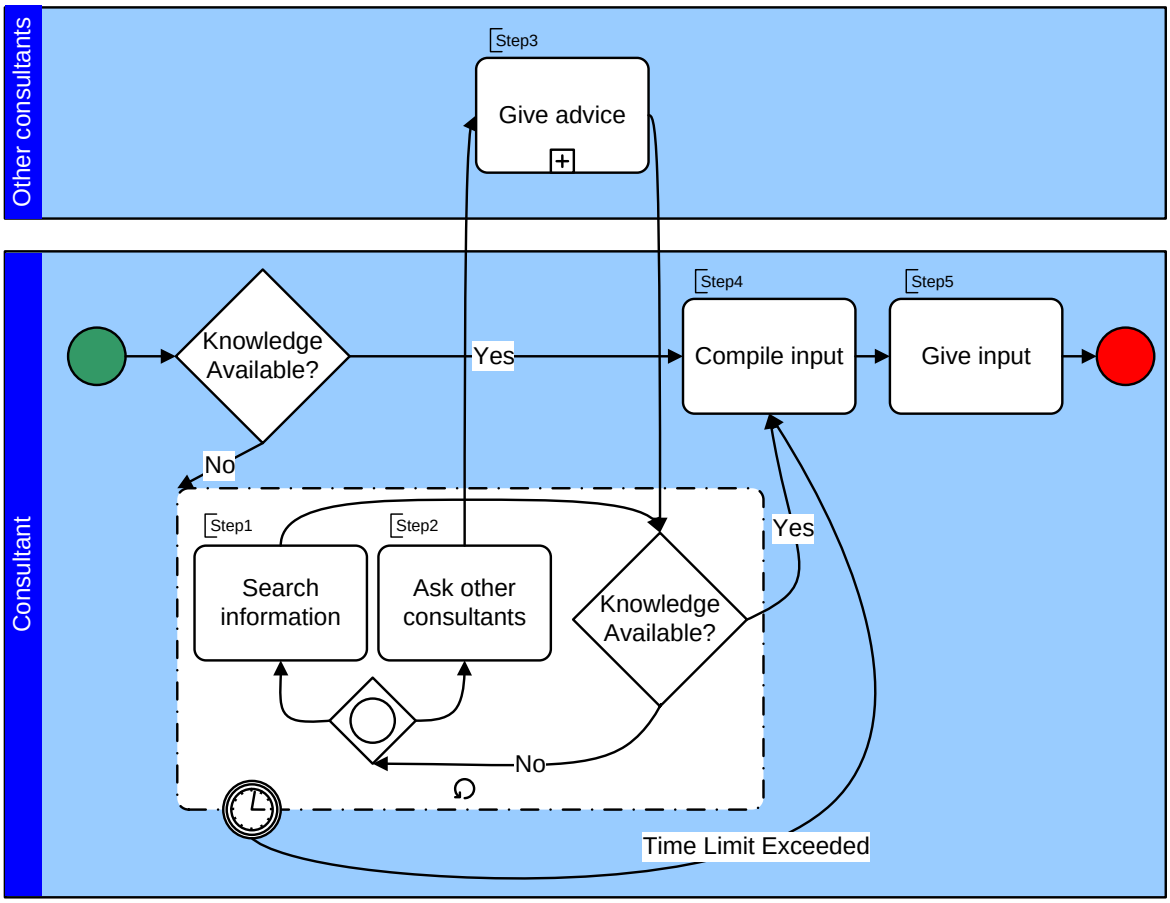
BP7: Participating in knowledge sharing sessions with other consultants from other companies

In BP07 the given Intenzz consultant provides input in a knowledge sharing session where consultants from competitors are present. Intenzz organizes this kind of session to build knowledge and share best practices in the market. The mutual sharing of knowledge continues until the pre-defined goal has been reached. These sessions are very powerful in fighting the famous "Not-Invented-Here" syndrome (Katz & Allen, 1982). In many organizations knowledge created by other organizations is not used, because it is more prestigious to develop knowledge than adopt others' ideas or because there is a lack of trust in the quality of the received ideas. These knowledge sessions not only lead to brilliant ideas, but at the same time create the necessary trust to avoid the "Not-Invented-Here" syndrome. In this business process, giving input is a subprocess, which can be expanded as a knowledge process (KP07). KP07 is identical to KP01; therefore Step2, 3, and 5 are in focus to analyze knowledge sharing.

Business process:



Knowledge process:

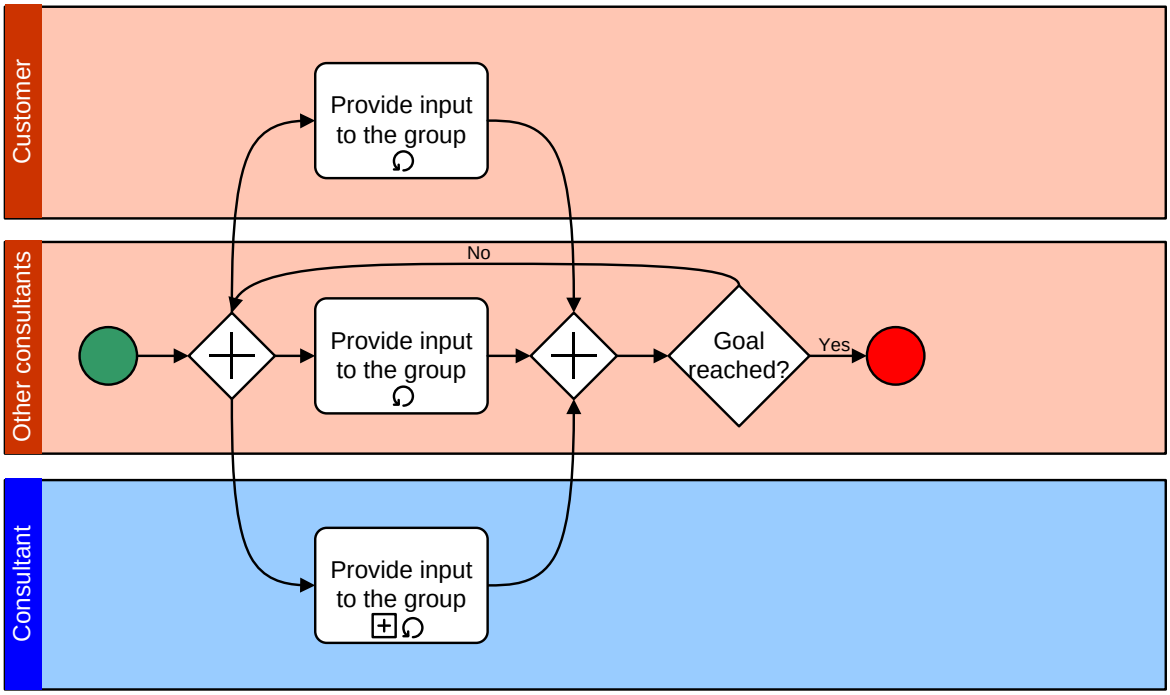


BP8: Participating in VNSG focus groups

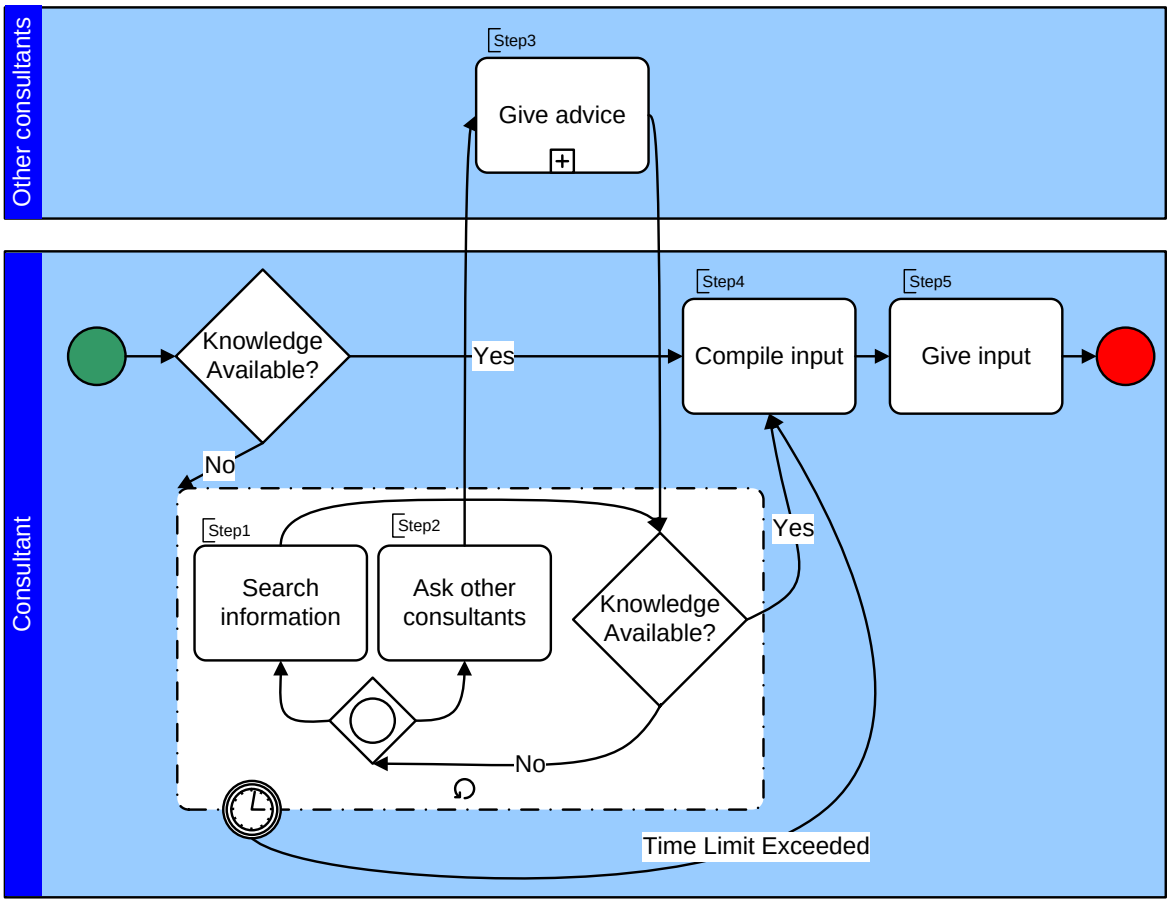
In BP08 Intenzz consultants, non-Intenzz consultants and even the customer share knowledge. VNSG is the Dutch-speaking SAP Users Organization in the Netherlands. VNSG has more than 600 members which are organizations running one or more SAP software. The goal of VNSG is to help companies get more value from their SAP system. The hundreds of members feel a need to join forces and exchange their experiences with SAP implementations and voice their mutual concerns to SAP. The exchange of ideas takes place in more than 20 different focus groups, all initiated by individual interest in a specific area within the SAP product. These interests are focused on industry, roles and tasks (such as the maintenance of software) and form an excellent networking opportunity for SAP professionals. Even though the purpose of these focus groups is to provide a platform for knowledge exchange of SAP customers, many of the topics discussed are too technical for many customers and mostly only very specialized consultants can benefit

from the meetings. This is, of course, contrary to the original purpose of VNSG, but reality shows this pattern. In BP08 all three of the most important players of the SAP consulting business participate: Intenzz consultants, the competition and the customers. Giving input is a subprocess, which can be expanded as a knowledge process (KP08). KP08 is identical to KP01; therefore Step2, 3, and 5 are in focus to analyze knowledge sharing.

Business process:



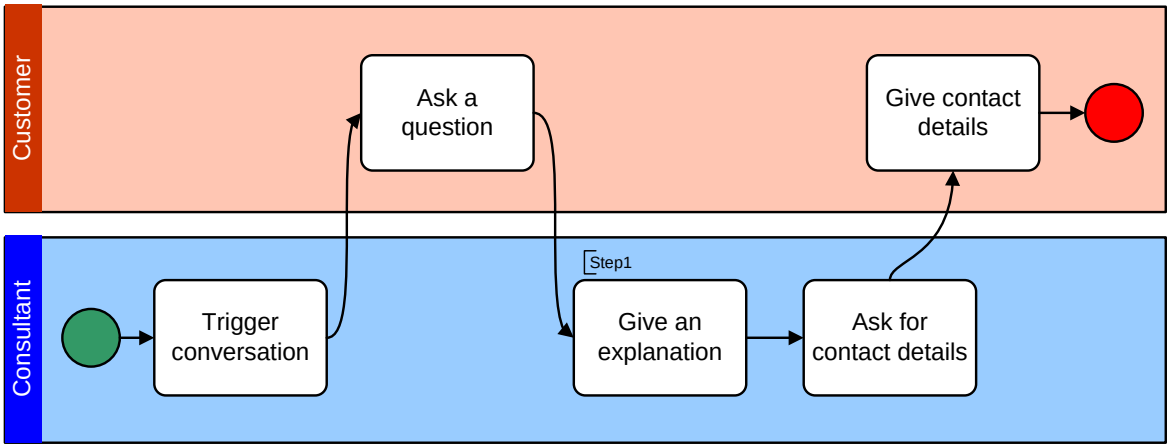
Knowledge process:



BP9: Representing the company at the VNSG Congress

In BP09 the Intenzz consultant talks to a customer. VNSG Congress is a yearly congress of SAP users and consultants in the Netherlands. The fair lasts two days; there are usually almost 3,000 visitors and almost 100 sponsors. Intenzz, just as other major consulting firms, has a stand each year to make itself known in the market. This business process starts with an Intenzz consultant triggering a conversation with a customer. The situation is that the customer walks by the Intenzz stand, slows down, because something drew his/her attention to the stand and in that moment the Intenzz consultant starts a conversation. Eventually the customer asks a question such as “What is the focus of Intenzz?” or “Why do think about …?” or “Does your company have experience in …?”, and the Intenzz consultant gives an explanation. After the explanation she/he asks for the contact details of the customer for customer relationship management purposes. The customer gives these details and this is the end of the process. Giving the explanation (Step1) is in focus to analyze knowledge sharing.

Business process:

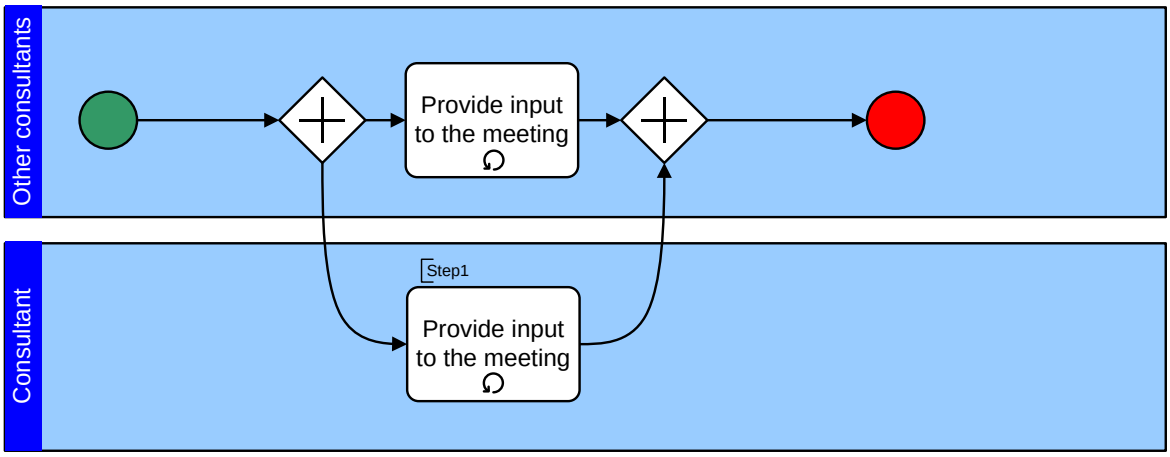


Knowledge process: giving an explanation is just one process step, not a collapsed sub-process; therefore a separate knowledge process model is not necessary.

BP10: Participating in company meetings

In BP10 the given consultant together with the other consultants provide some feedback to the meeting. For example, the owner present the financials of the company from the previous quarter and the consultants make comments about it. Providing input to the meeting (Step1) is in focus to analyze knowledge sharing.

Business process:

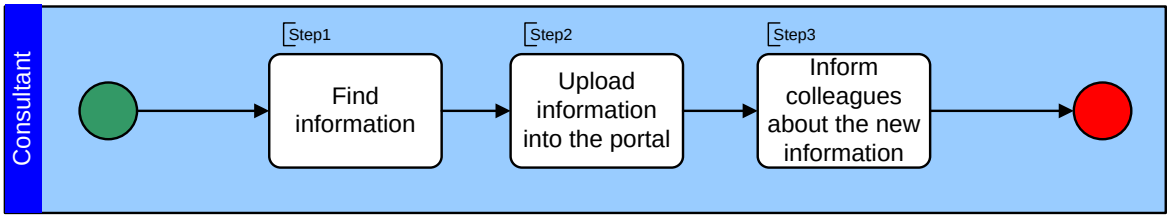


Knowledge process: providing input is just one process step, not a collapsed sub-process; therefore a separate knowledge process model is not necessary.

BP11: Uploading content to the portal

In BP11 the given consultant acts alone, without the interaction of others. Step1 is to find information, Step2 is to upload this information into the portal, and finally, Step3 is to inform the colleagues about the new information. For example, a consultant finds an informative pdf document describing a certain functionality in SAP. She/he thinks that this document would be interesting for all her/his colleagues too, so she/he decides to upload it into the Intenzz portal (http://www.portal.intenzz.nl) and send an email to the whole company (or just one group) with a link to the uploaded document. This business process contains only knowledge management activities; therefore BP11 is KP11 at the same time. Informing colleagues about the new information (Step3) is in focus to analyze knowledge sharing.

Business process:

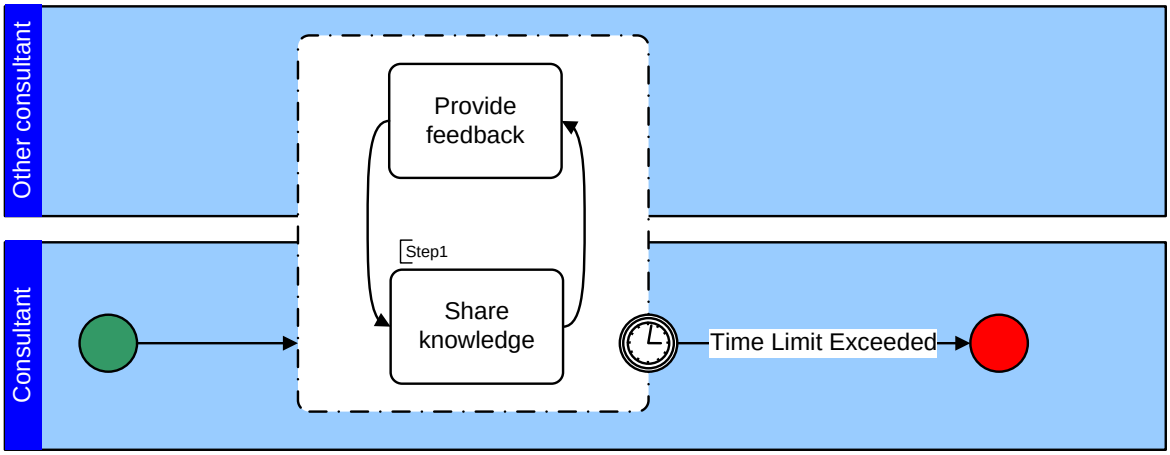


Knowledge process: each step of the above process is handled by the given consultants and each step is knowledge management related; therefore the above business process is a knowledge process at the same time.

BP12: Teaching a colleague

In BP12 the given consultant teaches something to other consultants. This happens mostly if a consultant gains a lot of experience in a given topic and others are interested in learning about it. Typically, there is a lot to share and time is limited; therefore the interaction stops only when time runs out. This business process contains only knowledge management activities; therefore BP12 is KP12 at the same time. The step of Sharing knowledge (Step1), obviously, is in focus to analyze knowledge sharing.

Business process:



Knowledge process: sharing knowledge is just one process step, not a collapsed sub-process; therefore a separate knowledge process model is not necessary.

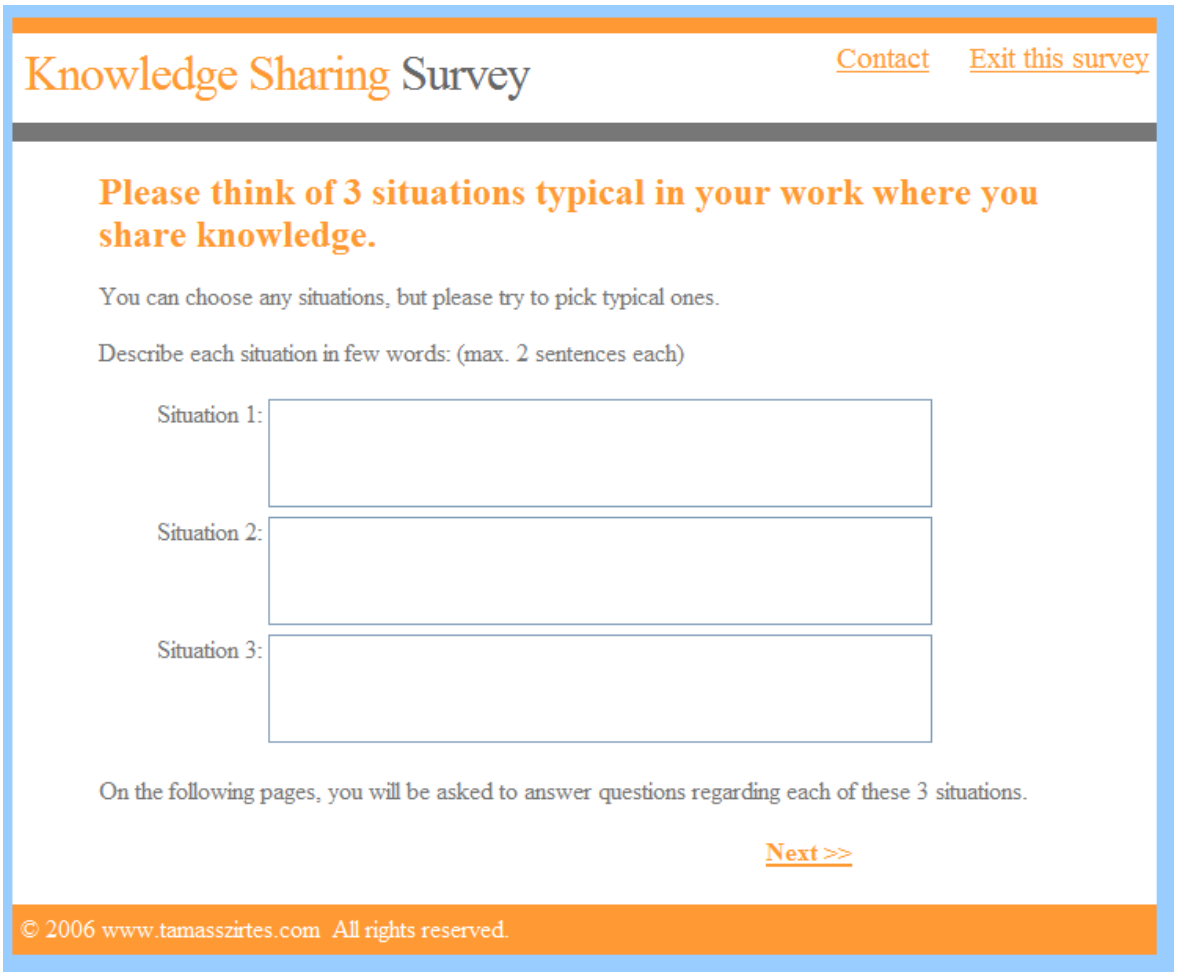
8.7 APPENDIX 7: Online Survey

8.7.1 Data entry

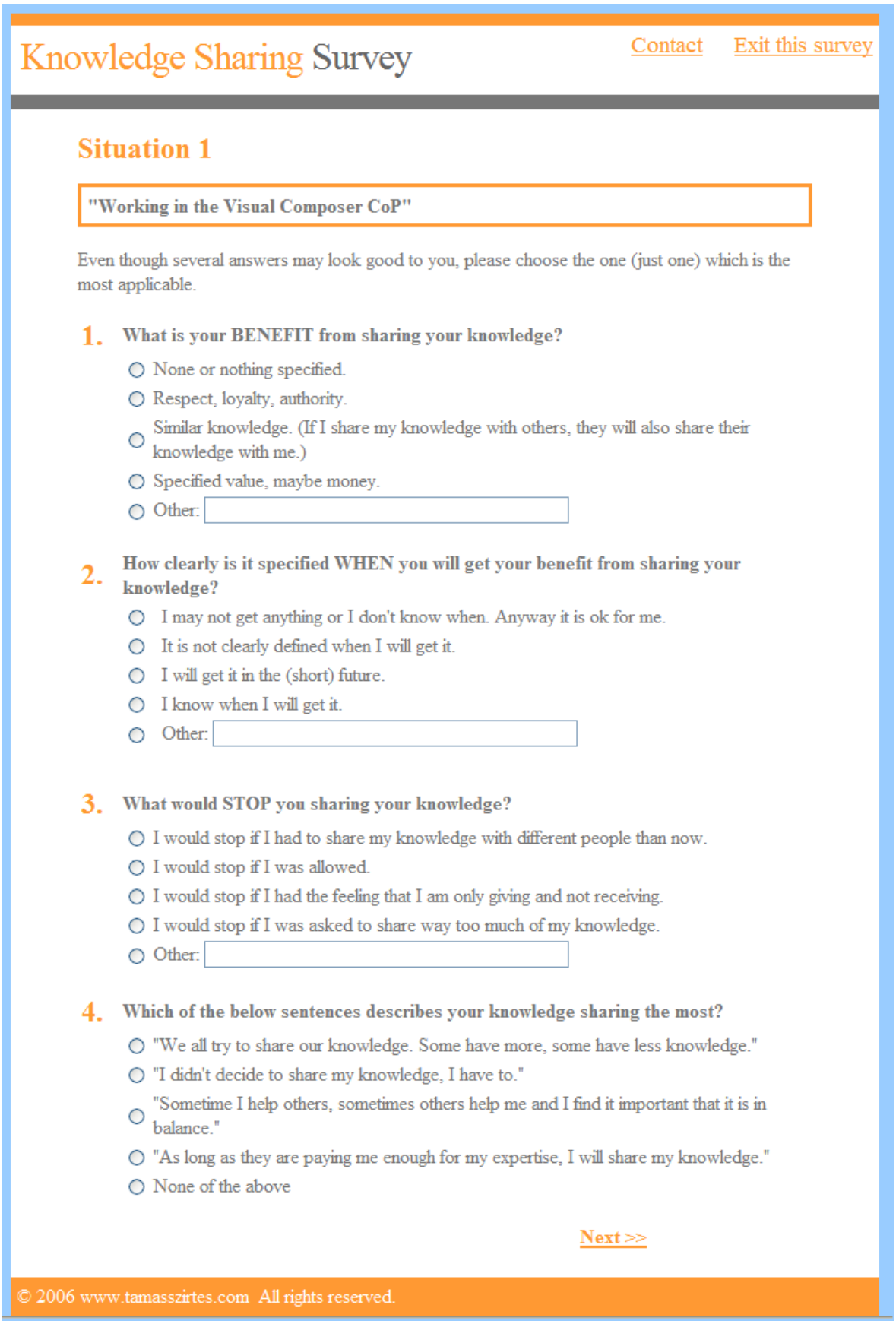
Screen 1:

Screen 2:

Screen 3:


Knowledge Sharing Survey
Contact
Exit this survey
Please think of 3 situations typical in your work where you share knowledge.
You can choose any situations, but please try to pick typical ones.
Describe each situation in few words: (max. 2 sentences each)
Situation 1:
Situation 2:
Situation 3:
On the following pages, you will be asked to answer questions regarding each of these 3 situations.
Next >>
© 2006 www.tamasszirtes.com All rights reserved.

Screen 4 is for the first knowledge sharing situation, Screen 5 for the second, and Screen 6 for the third one:



Knowledge Sharing Survey

Contact Exit this survey

Situation 1

"Working in the Visual Composer CoP"

Even though several answers may look good to you, please choose the one (just one) which is the most applicable.

1. What is your BENEFIT from sharing your knowledge?

- ○ None or nothing specified.
- ○ Respect, loyalty, authority.
- ○ Similar knowledge. (If I share my knowledge with others, they will also share their knowledge with me.)
- ○ Specified value, maybe money.
- ○ Other:

2. How clearly is it specified WHEN you will get your benefit from sharing your knowledge?

- ○ I may not get anything or I don't know when. Anyway it is ok for me.
- ○ It is not clearly defined when I will get it.
- ○ I will get it in the (short) future.
- ○ I know when I will get it.
- ○ Other:

3. What would STOP you sharing your knowledge?

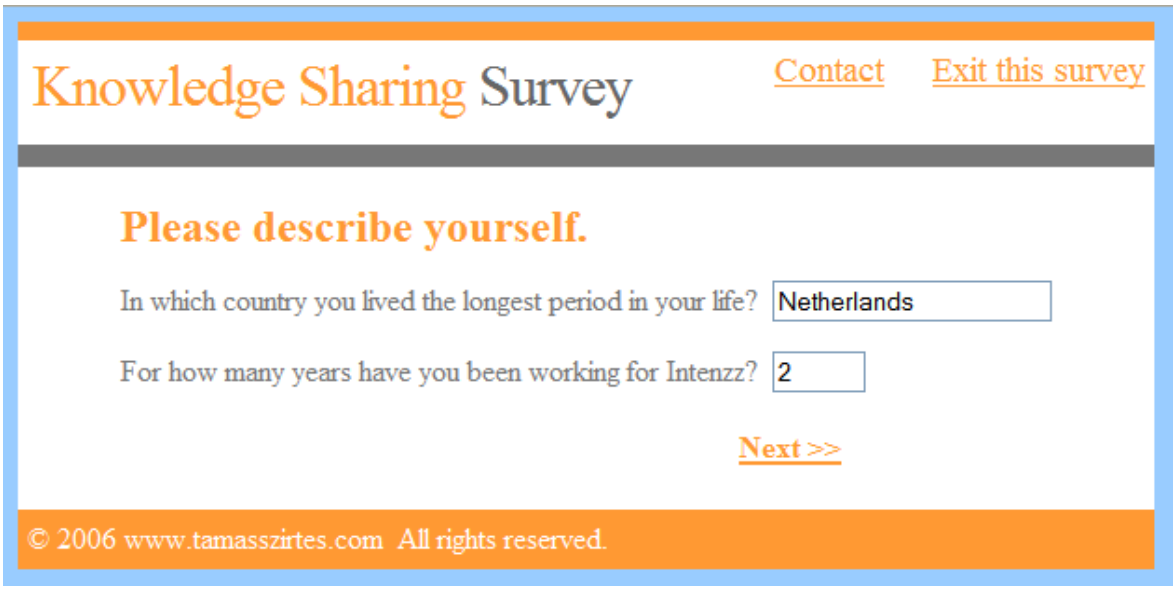
- ○ I would stop if I had to share my knowledge with different people than now.
- ○ I would stop if I was allowed.
- ○ I would stop if I had the feeling that I am only giving and not receiving.
- ○ I would stop if I was asked to share way too much of my knowledge.
- ○ Other:

4. Which of the below sentences describes your knowledge sharing the most?

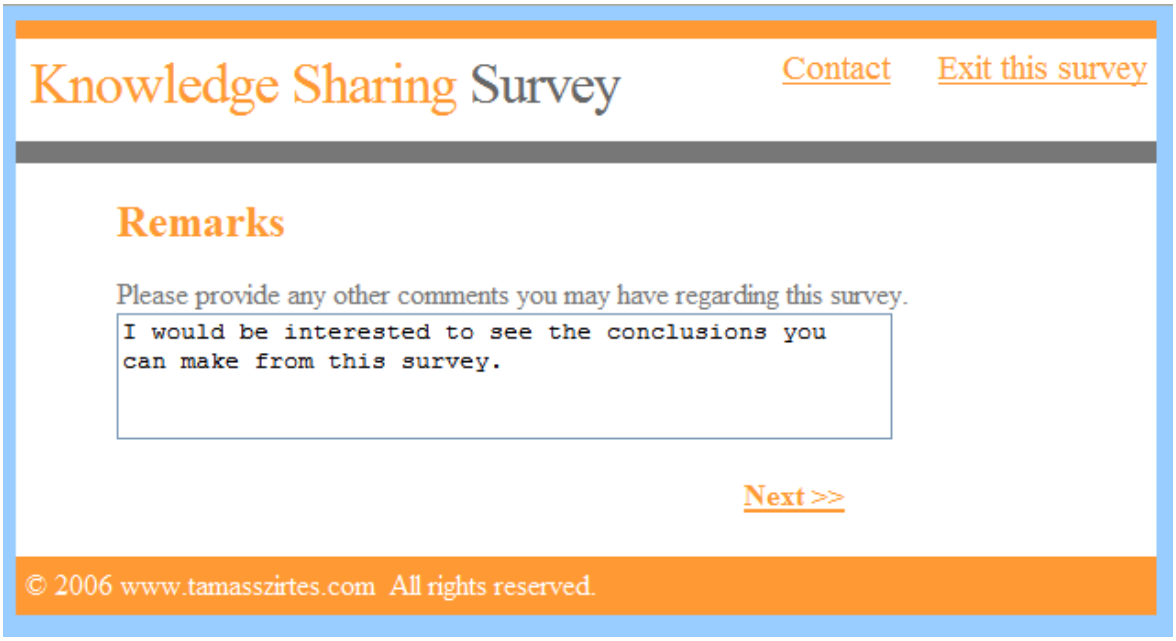
- ○ "We all try to share our knowledge. Some have more, some have less knowledge."
- ○ "I didn't decide to share my knowledge, I have to."
- ○ "Sometime I help others, sometimes others help me and I find it important that it is in balance."
- ○ "As long as they are paying me enough for my expertise, I will share my knowledge."
- ○ None of the above

Next >>

Screen 7:



Screen 8:



Screen 9:

8.7.2 Data storing

The data entered in the survey by the users are saved in a flat file. Here is a sample data structure:

USER (83.87.146.63)

SITUATIONS (83.87.146.63)

---------- (83.87.146.63)

Working in the Visual Composer meetings (83.87.146.63)

Pre-sales meeting with a customer (83.87.146.63)

Answering questions in emails (83.87.146.63)

SITUATION 1 (83.87.146.63)

---------- (83.87.146.63)

q1a3 (83.87.146.63)

q2a3 (83.87.146.63)

q3a3 (83.87.146.63)

q4a1 (83.87.146.63)

SITUATION 2 (83.87.146.63)

---------- (83.87.146.63)

q1a4 (83.87.146.63)

q2a2 (83.87.146.63)

q3a4 (83.87.146.63)

q4a4 (83.87.146.63)
SITUATION 3 (83.87.146.63)
---------- (83.87.146.63)
q1a3 (83.87.146.63)
q2a2 (83.87.146.63)
q3a3 (83.87.146.63)
q4a3 (83.87.146.63)
PERSON (83.87.146.63)
------ (83.87.146.63)
Netherlands (83.87.146.63)
2 (83.87.146.63)
COMMENTS (83.87.146.63)
-------- (83.87.146.63)
I would be interested to see the conclusions you can make from this survey. (83.87.146.63)

The structure starts with the word “USER”. Each line is concatenated with the string of the IP address of the user. This makes the data storing traceable and still anonymous. Where the data entry is text, the text is saved. Where it is multiple choice, only a code is saved. The code has the following format: q<ID>a<ID>, where ID refers to the location of the item in the complete list. E.g., the ID of the 2nd question is 2, the ID of the 3rd answer is 3.

8.8 APPENDIX 8: Questionnaire used for the Employee Interviews

Name:
Date:

Please describe in few words, maximum in a sentence the reason you would share knowledge in the following situations:

Situation	Why would you share knowledge?
Preparing a knowledge session for a customer	
Sharing lessons learned from a training	
Giving SAP trainings	
Participating in knowledge sharing sessions with other consultants from other companies	
Participating in VNSG focus groups	
Representing the company in at VNSG Congress	
Participating in company meetings	
Uploading content to the portal	

8.9 APPENDIX 9: Knowledge Management Processes at Intenzz

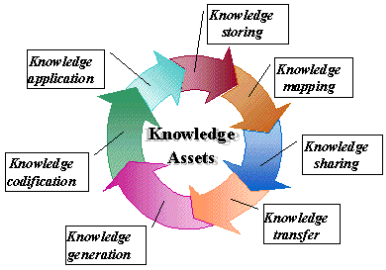
The following slides are part of the official Intenzz Model presentation which describes knowledge management within Intenzz.

intenzz
SAP consulting group

Knowledge Management

Consulting is a highly knowledge intensive business.

Intenzz focuses on each of the knowledge processes:



01/02/07 06:20 PM 7400_INTRO 12

intenzz
SAP consulting group

Knowledge Generation (learning)

In many companies		In Intenzz
No formalized goal	⟷	Integrated vision and goal
Knowledge driven by projects	⟷	Projects driven by knowledge
Knowledge from projects	⟷	Knowledge from Intenzz too (demo system)
Random reading	⟷	Development plan
SAP training courses	⟷	Continuous learning
Individualistic	⟷	Team-based
Hard skills	⟷	Soft and hard skills

01/02/07 06:20 PM 7400_INTRO 13

intenzz
SAP consulting group

Knowledge Codification and Storing

In many companies		In Intenzz
Focus on systems	⟷	Focus on relationships
Lack of motivation	⟷	See the value
More writing	⟷	More saving
Complex organization	⟷	Simple organization

01/02/07 06:20 PM 7400_INTRO 14

intenzz
SAP consulting group

Knowledge Application

In many companies		In Intenzz
Hard to apply	⟷	Easier to apply
Lost in the organization	⟷	Connected to service offerings and eventually to projects
Too much to be applied	⟷	Managable quantity

01/02/07 06:20 PM 7400_INTRO 15

intenzz
SAP consulting group

Knowledge Mapping

In many companies		In Intenzz
Standalone excercise	⟷	Basis for knowledge strategy
Mapped to focus areas	⟷	Mapped to service offerings and development plans too
Manager owns it	⟷	Consultant owns it

intenzz
SAP consulting group

Knowledge Sharing and Transfer

In many companies		In Intenzz
Project-based	⟷	Project and community-based
Present-based	⟷	Future-based (focus area)
Hierarchical (teaching each other)	⟷	Egalitarian (learning together)
Key is informing	⟷	Key is supporting, inspiring, focusing (dealing with information overload)

9 ACKNOWLEDGEMENTS

First of all, I would like to thank János Herczeg CSc (Head of Department of Management, Leadership and Marketing at the University of West Hungary) who gave me the very first explanation about how to successfully complete a PhD project and provided me with some excellent initial ideas. I would like to express special thanks to Prof.dr.ir. Mathieu Weggeman (Professor of Organization Science and Innovation Management at the Department of Technology Management at Eindhoven University of Technology in the Netherlands) for his decisive help of directing my interest to Fiske's Relational Models Theory, which became cornerstone of the whole project.

I would particularly like to thank my supervisor István Szűts CSc (Associate Professor at the Department of Management, Leadership and Marketing at the University of West Hungary), who with his wise suggestions helped me to write this dissertation. I would like to mention dr.ir. Hans Berends (Associate Professor of Organization Science and Innovation Management at the Department of Technology Management at Eindhoven University of Technology in the Netherlands) as well, who gave me some very useful leads regarding the status of research in the field of knowledge sharing.

I would like to point out that I am deeply indebted to Prof. Alan Page Fiske (Professor of Anthropology at the University of California, Los Angeles, USA), the author of the main theory of this dissertation, for giving me very insightful and unbelievably prompt answers to my questions.

My thanks also go to György Árendás and Erika Égetõ, who guided me through the administrative challenges of this PhD project.

Many thanks are due to Frank Kurstjens and Pascal de Zwart, the owners of Intenzz SAP Consulting Group, for supporting my project and allowing me to conduct research at the organization, and the helpful Intenzz employees for their participation in the research.

I would like to express special thanks to my friend Bruce, who I met more than a decade ago when he was giving me classes about Middle East politics and American foreign

policy. His corrections in terms of grammar and style together with his wise comments improved this dissertation to an extent that one can only expect from such a good friend.

Last, but clearly not least, one can never give enough thanks to my wife and parents, who continuously helped me through the difficulties that such an intensive project caused. Their support is the most invaluable and I am deeply grateful to them.

NYILATKOZAT

Alulírott Szirtes Tamás jelen nyilatkozat aláírásával kijelentem, hogy a "Management of knowledge sharing patterns" című

PhD értekezésem

önálló munkám, az értekezés készítése során betartottam *a szerzői jogról szóló 1999. évi LXXVI. tv.* szabályait, valamint a Széchenyi István Gazdálkodás- és Szervezéstudományok Doktori Iskola által előírt, a doktori értekezés készítésére vonatkozó szabályokat, különösen a hivatkozások és idézések tekintetében.[1]

Kijelentem továbbá, hogy az értekezés készítése során az önálló kutatómunka kitétel tekintetében a programvezetőt illetve a témavezetőt nem tévesztettem meg.

Jelen nyilatkozat aláírásával tudomásul veszem, hogy amennyiben bizonyítható, hogy az értekezést nem magam készítettem, vagy az értekezéssel kapcsolatban szerzői jogsértés ténye merül fel, a Nyugat-magyarországi Egyetem megtagadja az értekezés befogadását.

Az értekezés befogadásának megtagadása nem érinti a szerzői jogsértés miatti egyéb (polgári jogi, szabálysértési jogi, büntetőjogi) jogkövetkezményeket.

Sopron, ……..

..……

doktorjelölt

[1] **1999. ÉVI LXXVI. TV. 34. §** (1) A MŰ RÉSZLETÉT – AZ ÁTVEVŐ MŰ JELLEGE ÉS CÉLJA ÁLTAL INDOKOLT TERJEDELEMBEN ÉS AZ EREDETIHEZ HÍVEN – A FORRÁS, VALAMINT AZ OTT MEGJELÖLT SZERZŐ MEGNEVEZÉSÉVEL BÁRKI IDÉZHETI.
36. § (1) nyilvánosan tartott előadások és más hasonló művek részletei, valamint politikai beszédek tájékoztatás céljára – a cél által indokolt terjedelemben – szabadon felhasználhatók. Ilyen felhasználás esetén a forrást – a szerző nevével együtt – fel kell tüntetni, hacsak ez lehetetlennek nem bizonyul.