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INFORMATION NEEDS AND TACIT KNOWLEDGE MANAGE-
MENT IN GLOBAL SUPPORT
Master of Science Thesis

ABSTRACT

The global technical support needs different kind of information for operating efficiently and the information is always related either to customer or product. The support needs information from the all level of knowledge so that it can service local supports globally. The acquisition of the information should implement through the local support because it operates the closest the end customer. Sharing of information has an essential role in global transparency when the local and global supports need information from each other. The information needs can vary much between the cases but the most of the needs are common. The global support has often more specific and wider information needs because they have to resolve more complicated problems but in some of cases it is not worth asking all the possible information from the customer when the service can be handled with very limited amount of information. Too many questions and time consuming settling strain the customer and he may feel that the service is too complicated. So there has to focus on only mandatory information needs and if needed there can be asked more information from the customer later.

Tacit knowledge about the customers and products has an essential role in the technical support. However the tacit knowledge is not easy to manage because of its nature. The tacit knowledge is often knowledge which would benefit also other support processes if they are dealing with the same customers or products. When developing the tacit knowledge management there has to be considered the identifying, sharing, motivating and utilization of the tacit knowledge. The organization has to create atmosphere which appreciates the tacit knowledge and its sharing and the knowledge holders have to be identified before the tacit knowledge lost from the company. The sharing of tacit knowledge demands in many cases the face-to-face communication and showing the issue in practice. However in the global environment it is not possible communicate directly because of distance and therefore there is need of supporting technology. The tacit knowledge can be transferred from the local support level to the global level by utilizing the methods of sharing and social media tools. Procedures that are culture-bounded can be embedded into the IT tool so that the system becomes an example of organizational norms. The social media tools suits well for the tacit knowledge management because of its social aspect and it makes possible the sharing between different locations of participants. The best way to ensure that the tool is used is to make it easy to use and integrate it to other tools. Furthermore there has to be a clear plan for utilization of the social media tools in tacit knowledge management if there is to be any success in transferring knowledge between the local and global supports.

TIIVISTELMÄ

TAMPEREEN TEKNILLINEN YLIOPISTO
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Globaali tekninen tuki tarvitsee erityyppisiä tietoja toimiakseen tehokkaasti. Tietoja yhdistävä tekijä on, että ne liittyvät aina joko asiakkaaseen tai tuotteeseen. Tuki tarvitsee tietoa kaikilta tiedon tasoilta, jotta se pystyy palvelemaan paikallisia tukia globaalista. Paikallisen tuen tulisi hankkia tarvittavat tiedot, koska se toimii muutenkin lähempänä asiakasta. Tiedon jakamisella on tärkeä rooli globaalin läpinäkyvyyden kannalta, kun paikallinen ja globaali tuki tarvitsevat tietoa toisiltaan. Tietotarpeet voivat vaihdella paljonkin eri tapausten välillä, mutta kuitenkin suurin osa niistä on yhteneväisiä. Globaalilla tuella on kuitenkin usein tarkemmat ja laajemmat tietotarpeet, koska se ratkaisee monimutkaisempia ongelmia. Tämä tekee tilanteesta vaikean, sillä kaikki tapaukset eivät eskaloidu globaalille tasolle, jolloin tietotarpeetkaan eivät ole niin tarkkoja. Tämän tyyppisissä tapauksissa ei ole tarpeen pyytää kaikkia mahdollisia tietoja asiakkaalta, kun palvelu voidaan hoitaa hyvin vähäisilläkin tiedoilla. Liian monet kysymykset ja aikaa vievä selvittäminen rasittavat asiakasta, ja hän saattaa tuntea palvelun hankalaksi. Joten tietotarpeissa tulee keskittyä vain pakollisiin, ja jos tarvetta lisätietojen hankkimiseen syntyy, ne voidaan pyytää myöhemmin.

Asiakkaita ja tuotteita koskevalla hiljaisella tiedolla on tärkeä rooli teknisessä tuessa. Hiljaista tietoa ei ole kuitenkaan helppo hallita sen luonteen vuoksi. Hiljainen tieto on usein hyödyllistä myös muille prosesseille, jotka toimivat samojen asiakkaiden tai tuotteiden kanssa. Hiljaisen tiedon hallinnan kehittämisessä tulee huomioida hiljaisen tiedon tunnistaminen, jakaminen, motivointi ja hyödyntäminen. Organisaation tulee luoda hiljaista tietoa ja sen jakamista arvostava ilmapiiri. Tiedon haltijat tulee tunnistaa ennen kuin hiljainen tieto katoaa yrityksestä. Hiljaisen tiedon jakaminen vaatii useissa tapauksissa kommunikointia kasvotusten ja näyttämistä, kuinka asiat toimivat käytännössä. Globaalissa ympäristössä ei ole kuitenkaan mahdollista välittömään kommunikointiin välimatkojen takia ja siten tukevan teknologian käyttö on välttämätöntä. Hiljainen tieto voidaan siirtää paikallisesta tuesta globaalille tasolle hyödyntämällä jakamisen menetelmiä ja sosiaalisen median työkaluja. Kulttuurisidonnaiset menettelytavat voidaan sulauttaa osaksi IT-järjestelmää niin, että järjestelmä tukee organisatorisia sääntöjä. Sosiaalisen median työkalut sopivat hyvin hiljaisen tiedon hallintaan niiden sosiaalisen näkökulman vuoksi ja ne myös mahdollistavat tiedon jakamisen kaukanakin toisistaan sijaitsevien osallistujien välillä. Paras tapa varmistaa, että työkalua käytetään, on tehdä siitä helppokäyttöinen ja integroida se muihin työkaluihin. Sosiaalisen median työkalujen hyödyntämiseen hiljaisen tiedon hallinnassa tulee olla selkeä suunnitelma, jos halutaan saavuttaa onnistunut tiedon siirtäminen paikallisen ja globaalin tuen välillä.

PREFACE

This has been a long journey: 19 years studying and now it is about to end. This Master's Thesis is the end of one era in my life and I have been enjoyed a lot. Of course there have been some difficult times when the goal has not been clear and motivation has been low but now I can look back and say that I have learned a lot and got amazing friends during doing that. I hope that I can continue my path wiser and enjoy from my friends' company also for a long time after this.

I want to thank my professor Samuli Pekkola who gave me valuable advices and also all the participants from the case company. This thesis would not be completed without support of my friends, family and Matias. How could I ever thank you enough?

Thank you so much! Now it is time to start a new era in my life.

Tampere, 18th of August 2013

Teija Puolanne

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ABBREVIATIONS AND TERMS

Data	Objective facts without a context.
E-collaboration	Electronic collaboration.
Explicit knowledge	The knowledge which can be documented easily.
Global technical support	The global support which services the local technical supports related to the technical questions. It is same as the global support.
HUB	The support which services the local countries nearby it in the specific geographical area.
Information	Classified, analyzed and summarized data with the context.
IT	Information technology.
Knowledge	Compared, analyzed and linked information which is connected to the dialog.
Local technical support	The local technical support which services the end customers related to the technical questions. It is same as the local support.
R&D	Research & Development.
SECI model	The framework for sharing the explicit and tacit knowledge.
Tacit knowledge	The knowledge which includes personal context of its holder.

1   INTRODUCTION

1.1   Background

Enterprises are facing more and more environments that are increasingly competitive. They may be able to cut costs to adapt to these environments but if they do not have the possibility to capture the knowledge of their employees, downsizing can result in a loss of critical information. (O'Leary 1998, p. 54.) Importance of traditional capital is decreased, while the importance of information and knowledge capital is increased (Ståhle & Grönroos 1999, p. 17). Information has become an important competitive factor for organizations (Elena 2010; Bhatt 2001, p. 68; Alavi & Leidner 1999, p. 2; Stenmark 2002; Sydänmaanlakka 2007, p. 175; Tocan 2012, p. 79) but there is a new challenge relating to that: how one can manage the huge amount of information that organizations have. A large problem is also that organizations do not know what they actually know. (Sydänmaanlakka 2007, p. 175.) If an organization wants to create a sustainable competitive advantage it has to know how to create, how to distribute, and how to utilize knowledge through the organization and how to attach it to organizational needs (Rahimli 2012, p. 37; Hassandoust & Kazerouni 2011).

Information and knowledge management challenges are typical for a global company. There is important information and knowledge all over the company but their utilization is limited and difficult. When companies expand internationally, geographic barriers can affect knowledge exchange and prevent easy access to information (O'Leary 1998, p. 54). One of the main problems of local knowledge is the non-availability of mechanisms to access knowledge which are in another location, e.g. in another country (Hassandoust & Kazerouni 2011). Needed information is usually in the organization but it is difficult to localize (Sydänmaanlakka 2007, p. 175). The information and knowledge is scattered and its classification is flawed. E.g. in the technical support line one needs information and knowledge from products but the problem is that the knowledge isn't localized, gathered and documented systematically.

Having the information available for everyone is difficult especially in large organizations. Organizations could be more efficient if they just knew what they know. Finding the right information or inventing things over and over again spends the organizations time unnecessarily. (Sydänmaanlakka 2007, p. 175.) A global manufacturing company, which has grown and expanded by doing acquisitions, has huge challenges to make the company whole and improve its transparency. Systems and processes do not have interfaces and the building of interfaces is expensive and time-consuming. When talking

about a global technology manufacturer, its support needs information and knowledge from many channels but transparency is often lacking or it doesn't exist at all. The one side of knowledge, tacit knowledge, is even more difficult to manage and demands special attention in a global company. These kinds of challenges are pushing enterprises to explore better methods for information and knowledge management.

Although management is aware of the potential of information and knowledge management for competitive advantage, there isn't consensus about the ways how the knowledge resources should be used (Bhatt 2001, p. 68). If organizations want to improve the information and knowledge management, the information and knowledge which organizations have should be visible to everyone. (Sydänmaanlakka 2007, p. 175.) Information and knowledge can be both on a local and global level and that is why the high degree of transparency is required. Every country may have own systems for information and knowledge management which makes the situation even more complicated.

1.2   Research questions and scope

This study will build an overview of information and knowledge management in global support. The goal of this study is to develop the co-operation between global and local technical supports by finding the most important information needs in both local and global support processes and researching possibilities to develop tacit knowledge management in global support. The research question is divided into two parts and both parts have their own specific questions.

RQ1: What information is needed in global support process?

Research question one can be divided into four sub-questions from which three first ones are researched through empirical study and the last one through theoretical study:
- How the support process works from local level to global level?
- What should the support process be developed?
- What kinds of similar information needs are there between different global support processes?
- How the information can be managed?

RQ2: How tacit knowledge management can be developed in global support?

Research question two can be divided into two sub-questions from which first ones is research through both empirical and theoretical study and the last one through theoretical study:
- How can tacit knowledge be gathered and utilized?
- How can tacit knowledge be transferred from local level to global level?

The study focuses on information needs and tacit knowledge management in global support of a manufacturing company. In this study the global support means support which helps the local technical supports from all over the world. If local support cannot solve the problem, it asks help from the global support. The scope in support is in technical support and remote monitoring. This study examines what kind of information needs there are in global support processes and describes the processes from start to end. The study also assesses the local support units' information needs.

The common factor in this study is the customer and the overall goal is to try to improve the customer service by developing the information and knowledge management. In all studied functions the customer shows a very important role, even if the function would not do business direct with customer. Another common factor is the product and when specially talking about support, the knowledge about the product plays an important role. In terms of knowledge the study especially focuses on tacit knowledge because its development is important but also difficult in support organization. The development of tacit knowledge focuses on process development when similar process does not exist.

This study has focus on the operational level of organization. The scope from information hierarchy is in information, more precisely information needs and in knowledge, and even more precisely in tacit knowledge. Global and local supports are both studied in this study because local support works closely with global support so it has to be examined also.

1.3   Research approach

The main philosophical foundations are positivism and hermeneutics. Positivism is relying only on facts by rejecting all uncertain things. Hermeneutics emphasizes concepts like interpretation, meaning, historical and understanding. (Olkkonen 1994, pp. 26-28.) The research has to be independent from the researcher and repeatable in positivism philosophy. If another researcher uses the same material and the same method, he has to get the same results. Material is usually quantitative in positivism. In hermeneutics one cannot guarantee independence from the researcher because one studies the research material from a specific point of view. Material is usually qualitative in hermeneutics. (Olkkonen 1994, p. 35.)

It is typical for a positivism research that as a source material it uses fact based theoretical information or extensive empirical material which can be handled by "hard" methods like probabilistic methods. A hermeneutic research also uses empirical material but as a difference the material contains limited number of cases and hereby cannot be subjected to statistical methods. The representativeness of material can be a problem but on the other hand the material makes deep data drilling possible and the findings can be

unexpected. (Olkkonen 1994, pp. 36-37.) When comparing positivism and hermeneutics, the level of truth or assurance is easily lower in the results of a hermeneutical approach. In a hermeneutical approach one sometimes has to be satisfied in a result which gives a new hypothesis or a new direction for continuing the research. But this kind of a result can also be valuable and it can take the science forward. (Olkkonen 1994, p. 36.)

Positivism and hermeneutics do not exclude each other in a research. E.g. in business studies these both approaches can alternate even in the same study. (Olkkonen 1994, p. 39.) The material which is used in this study is mostly qualitative and it will be approached in an interpretational way. The study focuses on one case company so there is a possibility to drill deeper in it. All these aspects mean that the study uses hermeneutical philosophy and that has to be taken into consideration when doing the assessment of the study.

One way to classify a research is with the purpose for which the information is used. According to this researches can be divided to descriptive and normative researches. Descriptive research tries to explain a phenomenon by creating descriptive concepts, describing processes, classifying phenomena, introducing correlations, explaining causalities or other way by increasing the understanding. Normative research tries to find results which can be used as an instructions when one develops or designs new. (Olkkonen 1994, p. 44.)

The way of information gathering and processing determines what kind of information one can produce (Olkkonen 1994, p. 50). Theoretical research studies theories using own reasoning. New theories are developed from already known and verified theories. Reasoning can be either deductive, when research happens from general theories to special case theories, or inductive, when a number of special case theories are the base for a general theory. Theoretical research is usually classified in the positivism approach because both use verified theories as a foundation. (Olkkonen 1994, pp. 51-52.) The first part of this study is theoretical so there is also positivism philosophy in this study.

There are many ways to classify the researched approaches but Finnish business economics has broadly adopted Neilimo & Näsi's (1980) business research classification (Kasanen et al. 1991, p. 315). The classification includes four different approaches: conceptual, decision-oriented, nomothetical and action-oriented (Neilimo & Näsi 1980). Kasanen et al. (1991) have added a fifth approach for this list: constructive. Figure 1.2 shows the relationship between these approaches.

Theoretical   Empirical

	Theoretical	Empirical
Descriptive	Conceptual approach	Nomothetical approach Action oriented approach
Normative	Decision-oriented approach	Constructive approach

Figure 1.2. *The relationship between different research approaches (Neilimo & Näsi 1980; Kasanen et al. 1991, p. 317).*

Conceptual approach is theoretical and descriptive. The aim of a conceptual approach is to create a concept system for the studied problem. A new concept system is needed for describing and identifying of a phenomenon. The concepts may be wholly new or more advanced versions from already known ones. The method includes analysis, synthesis and comparison. (Olkkonen 1994, p. 65.) The nomothetical approach is empirical and descriptive. It tries to find in accordance with positivism the connections between different features. The goal is to prove the causal or at least correlative connections. The result is often represented in a mathematical form: as a graphic, mathematical phrase or a tabulation. (Olkkonen 1994, 67-68.)

Action oriented approach tries to understand, in accordance with hermeneutics philosophy, the problem. The subjects are typically company's internal functions related questions and the people and their goals are also connected to the problems. So these studies handle organization's actions, managing, problem solving, decision making processes and developing and changing of processes. (Olkkonen 1994, p. 72-73.)

The decision-oriented approach is theoretical and normative. It tries to develop mainly mathematical based methods which can be used as a help for the decision making of a company. The results are usually mathematical models which give some recommenda-

tions for decisions or which can be used for studying the impact of a decision. (Olkko-nen 1994, p. 70.) The constructive approach is empirical and normative. It is close to the decision-oriented approach. But as difference the constructive approach highlights creativity, innovation and heuristics. It is required that the functionality of a result has to be verified in practice. (Olkkonen 1994, p. 76, Kasanen et al. 1991, p. 317.)

It is seldom typical for business science that a research can be classified only in one research approach (Olkkonen 1994, p. 80). This study also follows two different approaches: the theoretical part of this study has a conceptual approach and the empirical part of this study is following an action oriented approach.

1.4   Case study research

Research methods can be classified in many ways but one of the common distinctions is between qualitative and quantitative research methods (Mayers 1997). In this study the data for the empirical part is collected through observations and interviews, which are according to Ghauri and Grønhaug (2010, p. 104) the methods normally related to qualitative method. In qualitative method understanding is emphasized and observations and measurements happen in a natural setting and the perspective is holistic (Ghauri and Grønhaug 2010, p. 104, Kasanen et al. 1991, p. 313). While quantitative method emphasizes testing and verification, the measurements are controlled and the analysis of data is objective. Qualitative methods are flexible and unstructured and the several aspects of problem can be analyzed although the number of observations is low. (Ghauri and Grønhaug 2010, pp. 104-107.)

A research method is a strategy which moves from the philosophical assumptions to research design and data collection (Mayer 1997). Case study is a strategy for doing research which involves an empirical study of a particular contemporary phenomenon within its real life context and it uses multiple sources of evidence (Saunders et al. 2009, pp. 145-146). The goal is to get a deeper and more holistic view from the studied phenomenon than it is possible to get by gathering extensive material. The generalization of study results may cause problems when there is used the case study method. . (Kasanen et al. 1991, p. 314.)

The second part of this study is empirical where one uses the case study. According to Olkkonen (1994, p. 52) the case study is based on hermeneutics approach. Case study method is often used when one wants to study a single organization and wants to indentify factors involved in some aspects of an organization or smaller unit (Ghauri and Grønhaug 2010, pp. 109-115). This is why the case study suits well for this study also. This study examines one global organization so according to Saunders et al. (2009, p. 146) the case study strategy used is called a single case study. By selecting a single case

study it provides an opportunity to observe and to analyze a phenomenon that few have considered before (Saunders et al. 2009, p. 146).

1.5   Research structure

The study can be divided into three main parts as is shown in Figure 1.3: theoretical part, empirical part and conclusions. The first part is theory about information needs and development of tacit knowledge management. This part explains what should be taken into consideration when one tries to find the information needs. It tells also how information and tacit knowledge can be managed and introduces main frameworks relating to them. The second part explains chosen research methods and what kind of an organization the case company is. This part contains also the analyzed material and the results. The final part introduces the discussion and conclusions of the study which are based on both the theoretical and empirical parts.
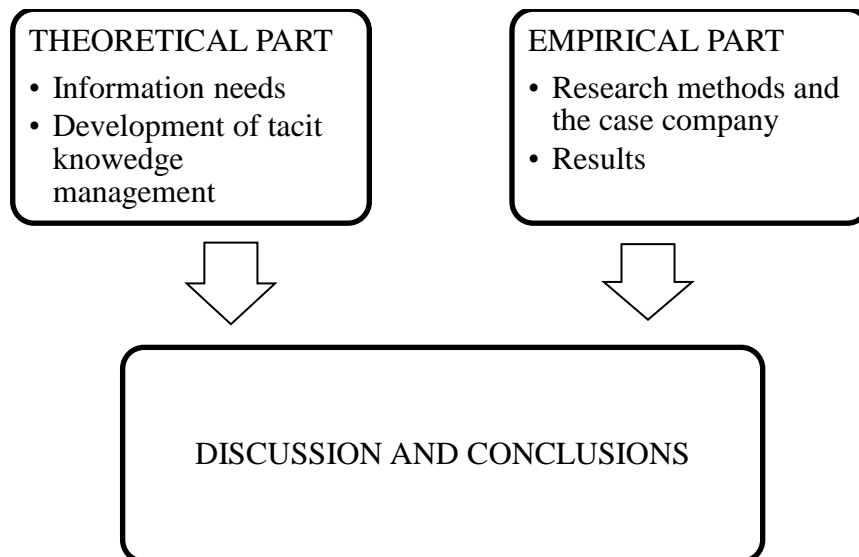

Figure 1.3. The research structure.

2 INFORMATION NEEDS

2.1 Information hierarchy

As it has been often pointed out that data, information and knowledge do not mean the same, but still many researchers use the terms very casually (Stenmark 2002). Data is separate, objective facts which have not been connected to any context. Data in organization context means often e.g. organized documents or recordings in information systems. (Virtainlahti 2009, pp. 31-32.)

Data becomes information when it is classified, analyzed, summarized and set in a context. Information can be described as a message, which has a sender and receiver. The meaning of information is to inform the receiver. (Virtainlahti 2009, p. 32.) Information provides a new point of view for interpreting and makes visible previously invisible meanings on unexpected connections. Information is a necessary material for eliciting and constructing knowledge. Both information and knowledge are context-specific and are created dynamically in social interaction among people. (Nonaka & Takeuchi 1995, pp. 58-59.)

Even though the terms "information" and "knowledge" are often used interchangeably, there is clear difference between them. When information is a flow of messages, knowledge is created by that flow of information, anchored in the beliefs and commitment of its holder. (Nonaka & Takeuchi 1995, p. 58.) Information becomes knowledge, when it has been compared, analyzed the consequences, created connections and connected to the dialog. When comparing knowledge to the data and information, knowledge is information related to insight, experience, intuition, review and values. (Virtainlahti 2009, p. 32.) Knowledge, unlike data and information, is about beliefs, commitment, action and meaning (Nonaka & Takeuchi 1995, p. 58). Knowledge is related to the individual's understanding and skills. Knowledge helps us to assess and combine new experiences and information. It has rooted deep in the organization's documents and information sources but also in the routines, processes, practices and norms of organization. (Virtainlahti 2009, p. 32.)

Data, information and knowledge can be represented in a traditional hierarchy form (see Figure 2.1). In addition to these there has been added also wisdom. The concept of wisdom includes a view of wider connections and meanings. Wisdom can be determined as a method which uses knowledge in the best way. (Virtainlahti 2009, p. 32.)
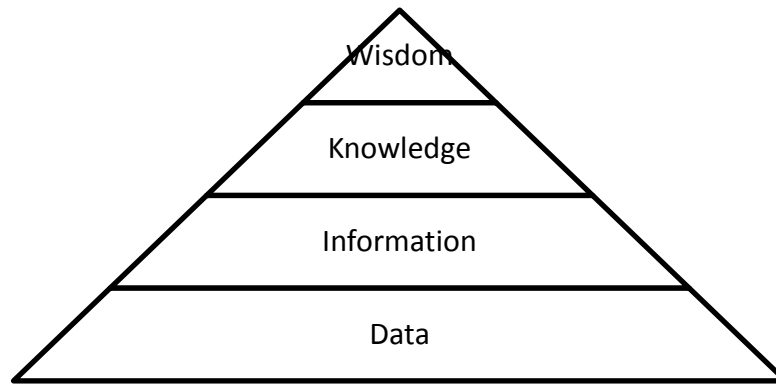
Figure 2.1. *The classification of knowledge (adapted from Virtainlahti 2009, p. 33).*

2.2 Information management process

One of the most well-known information management process is Choo's process model of information management. Choo (1998, p. 261) explains that information management should be viewed as the management of a network of processes that acquire, create, organize, distribute and use information. Figure 2.2 shows more specifically how the process proceeds.
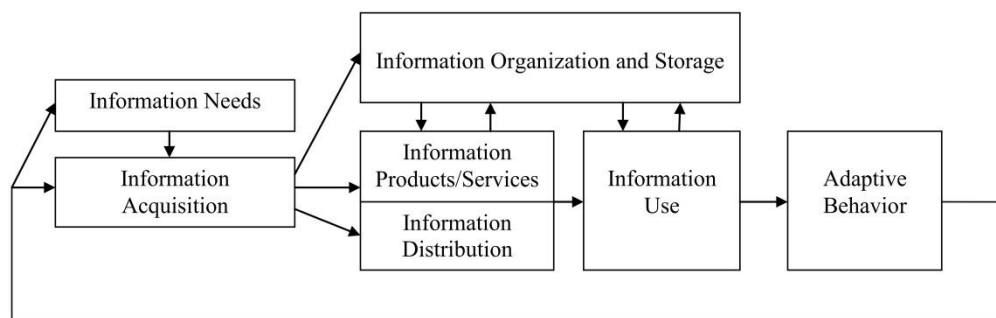
Figure 2.2. *Process model of information management (Choo 1998, p. 261).*

Information management can be seen as a continuous cycle of six closely related processes (Choo 1998, p. 261- 269):

1. *Identification of Information Needs* means the understanding of problems, uncertainties and ambiguities that happen in specific organizational situations. Systematic way of analysing the information requirements is to identify the groups of information users, recognize the typically problems, examine their work and social settings and understand the ways they try to solve the problem.

2. *Information Acquisition* is a critical but increasingly complex function in information management. It has two different kinds of demands: organizations' information needs are wide ranging because of fast changing environment but on

the other hand the organization has limited capacity so it has to select the messages it attends to.

3. *Information Organization and Storage* means that the information has to organize and store in computer databases, file systems and other information systems so that it would facilitate information sharing and retrieval. The way information is stored reflects how an organization percepts and represents environment and it represent a significant and frequently consulted component of the organization's memory.

4. *Information Products and Services:* The main function of information management is to ensure that information products and services support the identified information needs of organizational members. Information products and services should add value to the information and thus assist users to make better decisions.

5. *Information Distribution* is the process where the information is shared so that the right information reaches the right person in the right time, place and format. Wider distribution of information can achieve many positive consequences, such as organization learning and creation of new information based on the old one.

6. *Information Use* is process where is made meaning from information, created knowledge and selected patterns of action in a dynamic and social situation. Information is used throughout the decision-making process.

Sydänmaanlakka (2007, p. 172) presents another framework for information management. It has quite the same content as Choo's (1998, p. 261) model, only information needs are missing. Sydänmaanlakka's model has five sub-processes: creating, acquisition, storage, distribution and adapting. The objective of creation is to create new information and it can happen by doing e.g. self-study, group work or job rotation. Acquisition can happen by benchmarking, internet searching or reading, in which both internal and external resources can be used. The objective of storage is to improve availability of information and thus information can be more easily shared. Sharing can be implemented through emails, webpage, database systems or meetings. Information systems are an effective way to support information sharing but personal interaction has still a more important role. And the final phase, adapting, defines how well organization can utilize the information which it has. (Sydänmaanlakka 2007, pp. 172-174.)

Probst et al. (2000, p. 30) have also their own six-phase model for information management: 1) knowledge identification, 2) acquisition, 3) development, 4) sharing and distribution, 5) utilization and 6) retention. All these phases are handled as individual processes but phases have connected very closely to each other. As a difference to Choo's (1998, p. 261) or Sydänmaanlakka's (2007, p. 172) models, Probst et al. (2000, p. 30) has as a last phase "retention" which is also in other's models but is not emphasised this much in the end. Probs et al. (2000, p. 30) also use "knowledge" as a surro-

gate term for information. Another thing all these models have in common is that they are generic and because of that it is possible to compare them.

2.3   The nature of information needs

Person needs information to do his job effectively, solve a problem satisfactorily or pursue a hobby or interest happily. The fulfilment of need is beneficial or necessary to the individual. (Nicholas 2000, p. 20.) Information needs are people's cognitive needs which can be gaps or deficiencies in mental knowledge or understanding (Choo 1998, p. 51; Nicholas 2000, p. 20). Information needs are not stable as there are many factors that affect to them, such as individuals demographic factors (age, work role, specification at work, geographic location), context, density of information need (permanent/new), predictability, importance and level of complexity (Leckie et al. 1996, pp. 182-183). Information needs arise out of a desire to fulfil one or all of the three basic human needs: physiological (need for food, shelter etc.), psychological (need for domination, security etc.) and cognitive needs (need to plan, learn a skill etc.) (Nicholas 2000, p. 21).

Taylor (1968, pp. 178-194) suggests that an individual experiences four different types of information needs: a visceral need, a conscious need, a formalized need and a compromised need. At the visceral level, a person feels a vague sense of dissatisfaction and the need is hard to explain in linguistic terms. The visceral need may become the conscious need if it becomes more concrete and the importance grows. In the conscious level the person develops a mental description for indecision area but he experiences still some ambiguity. The person can consult with colleagues and friends and when ambiguity is reduced enough, the level rises up to the formalized level where the person can construct a qualified, rational statement of the information need as a form of question or topic. At this level the statement is made without considering what sources of information are available. When the person can modify the question in a form that could be understood by the information system, the information need is at the compromised level. (Taylor 1968, pp. 178-194.)

Auster & Choo (1996, pp. 67-68) in turn view information needs from three different perspectives: from a cognitive level, a system level and a user-group level. At the cognitive level an individual, who needs and utilizes information, is under examination. At the system level, organization tries to integrate relevant information into a company's processes and outputs. And at the group level the interest is in the groups of an organization, how they gather, process and utilize information. (Auster & Choo 1996, pp. 67-68.)

The identifying of information needs is one the most difficult functions of information management (Ashill & Jobber 2001; Global Intelligence Alliance 2005). Pirttilä (2000,

pp. 65-66) argues that the reason for this is the nature of information needs: they are unconscious and thus difficult to determine even with the best methods. Also Karlöf (2002, p. 225) agrees that problems are related to the identifying of information needs. He says that the dynamics of information is the one of the reasons for that. When both information and business environment are increasingly dynamic, the information needs for decision making also changes quickly. Success in helping people to meet their information needs is the understanding of difficulties and problems that are base of the needs (Nicholas 2000, p. 21).

When satisfying an information need, some retrieving from an information system or source is always involved. Information is sought and used in social situations so it usually satisfies also the affective and emotional needs. Furthermore, the information needs do not need to be fully formed but they can grow and evolve over time. Also the awareness of information need does not always need to lead to search if an individual decides to accept or suppress the problem. (Choo 1998, p. 51.)

People have the need for information and the wants express it (Nicholas 2000, p. 19). However they often speak information wants and needs like they would be the same thing but they are not (Kotler 2003; Marti 1996, pp. 126-129; Nicholas 2000, p. 19). This is often called an information gap. In many cases, there is an area where most relevant information can be found and to get the best possible solution the focus should be on the area where information wants and needs overlap. (Pirttimäki 2007, p. 43.) The area is marked as a star in Figure 2.3. Pirttilä (1997) emphasizes that this area is very important because of its utilization potential, even if information is difficult to gather from there.
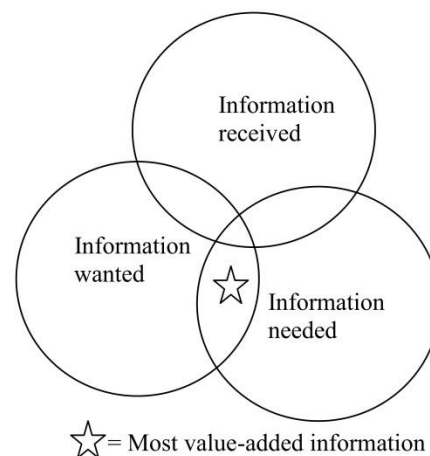

Figure 2.3. Information gap (adapted from Pirttimäki 2007, p. 43).

Like Figure 2.3 shows, there are often information needs which would be very valuable but there it is not possible to get the information because an individual feels that he do not need it or he do not understand its significance or its existence (Aguilar 1967, p. 7;

Ghoshal & Kim 1986, p. 57; Pirttilä 1997, p. 46). The information gap in Figure 2.3 is possible to categorize into three classes. First, an individual receives the information they need but they do not want. Second, there is gap between what a person wants and what he would really need. Third, there is gap between the information needed and the information received. (Aguilar 1967.) Vitt et al. (2002, pp. 15, 29) call this third cap an analysis-cap. They argue that it is impossible nowadays to find the information needed with acceptable cost and in a reasonable time because of information overload.

2.4 Information acquisition

Information acquisition is based on new information needs. A person usually selects the information acquisition channel by the information need situation and which channel suits best for the situation. This is called the principle of least effort. (Haasio & Savolainen 2004, p. 43-45.) Communication process also plays an important role in information acquisition. It involves sender, message, channel, recipient and a degree of shared context. (Ingwersen & Järvelin 2005, p. 8.)

Vaarnas et al. (2005, p. 92) determine four important questions for information acquisition:
1. For what is the information needed?
2. Why is information needed?
3. When is information needed?
4. How much will be invested in the information acquisition?

By finding answers to these questions the process of information acquisition gets more structured and easier to implement. A clear objective for information acquisition helps to proceed in the right direction and to get a better solution.

Organization gathers a huge amount of information from its internal and external resources. Most of this accumulating is done because of accepted rules or conventions or to satisfy requirements. E.g. accounting practices, company policies, standard operation procedures and government regulations determine what information to collect about which entities or activities and where or how to collect the information. Technology is utilized in the acquisition of information and it has significant meaning in procedural efficiency. (Choo 2002, pp. 29-30.)

Organizations have to work in a fast changing environment and they needs to absorb this variety. A powerful way of managing information variety is to use all possible resources. The more there is the members of organization gathering of information, the wider the information collection network is. In any organization the people always provide the most valuable information. The human sources filter and summarize infor-

mation, highlight the most important elements, interpret ambiguous aspects and generally provide richer communications about an issue. (Choo 2002, pp. 29-31.)

The general model of professional information seeking is introduced in Figure 2.4 determined by Leckie & Pettigrew (1997, p. 100).
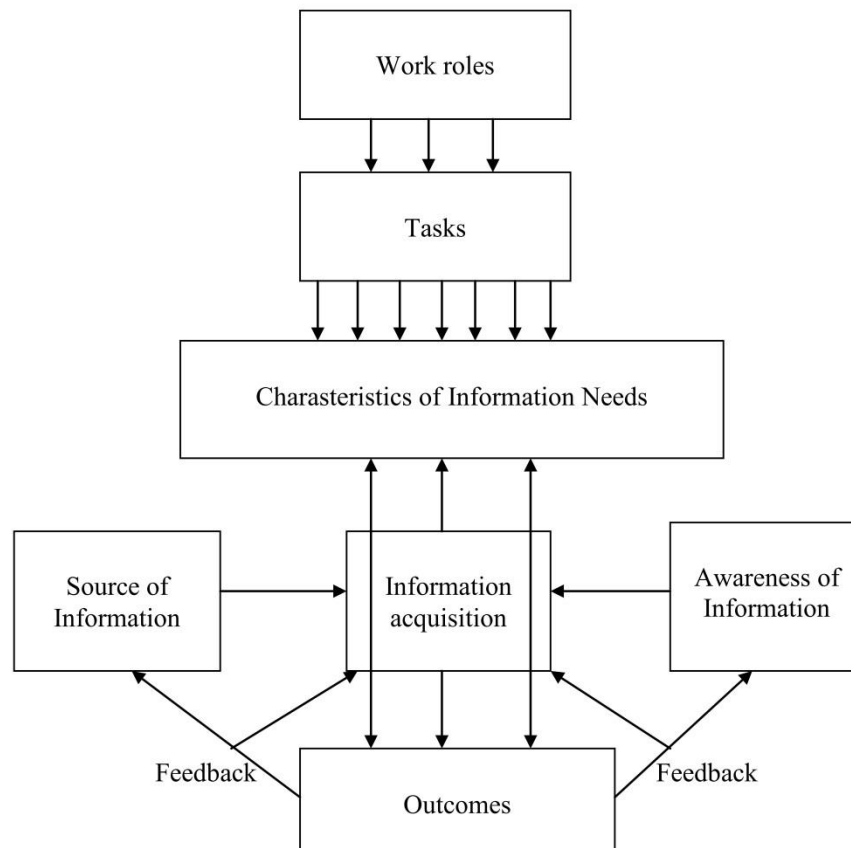
Figure 2.4. The general model of professional information seeking (adopted from Leckie & Pettigrew 1997, p. 100).

The main idea of the model is that the information needs are based on tasks and the tasks are determined by work roles. There are many things that have an effect on the information acquisition. The first this kind of component is the source of information which can be both individual sources and different literature sources. The second component is the awareness of information which means the way how information environment is perceived. The model ends to a result. The optimal result has been achieved when the information need is satisfied and the task is done. The result of information acquisition may lead to reappraisal and a new, complementary information acquisition because of feedback. So this model shows that the information acquisition does not necessarily proceed linearly but it can include cyclic features. (Leckie & Pettigrew 1997, pp. 102-103.)

3   DEVELOPMENT OF TACIT KNOWLEDGE MANAGEMENT

3.1   Tacit knowledge

The concept of knowledge comes from the era when Aristoteles and Platon lived. Platon defined the knowledge for 'well-argued real belief'. This is the classic definition of knowledge. (Virtainlahti 2009, p. 31.) Knowledge can be divided to different dimensions. Classification between a tacit and explicit knowledge is the most commonly used. (Virtainlahti 2009, pp. 37, 42-43; Wyatt 2001, p. 6.) However the borderline between the tacit and explicit knowledge is not clear and a different researcher can use the concepts in a different way. Hungarian chemist, economist and philosopher Michael Polanyi talked about tacit and explicit knowledge already in the 1950s and highlighted that tacit and explicit knowledge are related to each other very closely and both are the constituent part of knowing. Tacit knowledge is necessary background knowledge which allows the processing and developing of visible knowledge. The explicit (visible) knowledge defines the processing and makes it visible. Polanyi argues that no knowledge is explicit entirely, but all the knowledge is tacit or is based on tacit knowledge. (Virtainlahti 2009, pp. 37, 42-43.)

So the concept of knowledge includes both well-argued real belief and tacit dimension, which cannot be fully described explicitly even if it directs our actions constantly. (Virtainlahti 2009, pp. 37-38.) When explicit knowledge is mostly written, experienced knowledge is most naturally expressed as a communicated language. At least two people are always needed for communication, therefore the tacit knowledge becomes organization's property only in social interaction. (Ståhle & Grönroos 1999, p. 91.)

The term of visible knowledge has different kind of versions like explicit knowledge, precision knowledge, articulated knowledge or public knowledge. All these terms mean formal and systematic knowledge, which can be expressed by words, numbers or e.g. with help of graphs. The visible knowledge is easy to process e.g. with a computer and it can be saved in databases. It can be forwarded in an electronic format or traditionally paper format easily. (Virtainlahti 2009, p. 43.) Explicit knowledge consist of facts, rules, relationships and policies which are possible to codified in paper or electronic form and shared without discussion (Virtainlahti 2009, p. 43; Wyatt 2001, p. 6).

The tacit knowledge instead is more of an abstract knowledge. It is very personal as it includes personal opinion, views, intuition and hunches. The tacit knowledge includes also its holder's experiences, ideas, values and feelings and it is rooted very deep into the individual. Japanese professors Ikujiro Nonaka and Hiroka Takeuchi brought the concept of tacit knowledge into business research. The word 'tacit' comes from Latin word tacitus, which means quit, silent, non-speaking, calm, mute (Virtainlahti 2009, p. 15, 37, 43.)

If a human knows more than he can tell or describe, he has tacit knowledge. He has the knowledge and he can act according to it but he cannot describe it explicitly. (Virtainlahti 2009, pp. 37-38.) Tacit knowledge is always difficult to describe precisely, shortly and unambiguously (Ståhle & Grönroos 1999, p. 90; Virtainlahti 2009, p. 38).

Humans have lots of different skills both in work and everyday life (Virtainlahti 2009, p. 38). Tacit knowledge shows in different actions in practice even we do not notice it (Ståhle & Grönroos 1999, p. 91; Virtainlahti 2009, pp. 38-39). Usually the things that we can do well change to routine and then the indentifying of own performance becomes very difficult. These automatic actions affect constantly on many different things, like to our actions and decision making. (Virtainlahti 2009, pp. 38-39.) Most of people's know-how is based on tacit, experienced knowledge. So person knows and acts most of the time irrationally, through feelings and based on know-how. This happens so that the person cannot explain his actions logically. (Ståhle & Grönroos 1999, p. 90.)

Tacit knowledge is individual-, cultural- and context-dependent. Individuals have collected tacit knowledge through their lives and careers in different kind of situations. So the removal of the individual's background from the tacit knowledge is not entirely possible; the tacit knowledge is always associated with its holder's own history. People observe and perceive things with their own ways, personally and uniquely. The individual-dependent and personality of tacit knowledge make its sharing difficult. (Virtainlahti 2009, pp. 48-49.)

Tacit knowledge occurs often as a synonym for know-how and professionalism. The works become fluent with help of tacit knowledge: it improves the performance of tasks, quality and enhances decision making and customer service. Thus the tacit knowledge has a significant role at work. Professional skill is based on broad base of tacit knowledge, which helps to react to different kind of tasks and problems in right way. People find it often difficult to identify tacit knowledge at their work. The concept of tacit knowledge is often known but linking it to the practical events is not so simple. The concept shows a significant role in the retiring of employees when the knowledge is threatened to disappear from the organization. The economic situation has also raised the importance of tacit knowledge because of staff layoffs. (Virtainlahti 2009, p. 38, 41, 47.)

Tacit knowledge defies recoding and underlies personal skill, and it requires face-to-face contact or apprenticeship for transfer (Wyatt 2001, p. 6). Tacit knowledge is personal but it can be shared between individuals collective. Tacit knowledge affects the individual's ability to act independently and skillfully. It is reached through experience. (Virtainlahti 2009, p. 48.) If a person wants a part of the other's tacit knowledge, the person has to co-operate and talk with others. Tacit knowledge can only be transferred by doing and through talking. (Ståhle & Grönroos 1999, p. 91.) However Wyatt (2001, p. 6) argues that over time some tacit knowledge becomes amenable to analysis and also allows recording explicit form.

Social tacit knowledge can be separated from the tacit knowledge. It can be related to individuals or groups. When it is related to individuals it is knowledge about group's identity: what it means to be a group member and how to be a group member. The social tacit knowledge, which is related to the group or institute, is held by the whole organization. E.g. there might be complex travelling rules in a big, bureaucratic organization and an individual has not them all as a whole but the knowledge exists somewhere in organization level. When the social tacit knowledge is related to a group, it is knowledge about how the groups and teams work together, how the decisions are done and how the communication works. (Virtainlahti 2009, p. 49.)

3.2   Tacit knowledge management

Knowledge management should be considered because of four causes: competition, customer focus, challenges of a mobile employee and global imperative. The market is an increasingly competitive area and knowledge-based management is developing faster and faster. (Rahimli 2012, p. 38.) To maintain dominant advantage over competition in today's highly competitive environment, all available knowledge has to be utilized (Hassandoust & Kazerouni 2011). Customer focus should be the top priority for every company. Employee's retirement and mobility lead to knowledge loss. Globalization has led to companies that have foreign customers and suppliers. So the need for effective knowledge management has risen. (Rahimli 2012, p. 38.)

The traditional knowledge management rules the organization's knowledge bases from the perspective of control and ownership. The meaning of knowledge management is to transfer the knowledge of individuals to explicit form when the knowledge is not tied working community's individuals but it is organization's resource and manageable traditionally. The explicit dimension of knowledge can be owned, stored and shared thought authority. But when talking about non-codified knowledge the ownership is difficult to determine. So instead of traditional knowledge management companies have to find new ways to manage the tacit knowledge which is in an abstract form, difficult to transfer and share. (Virtainlahti 2009, p. 73.)

In knowledge management the difficulty is not handling explicit knowledge but tacit knowledge, which is harder to express and codify. Very often organization's most valuable knowledge is in the heads of people and this includes also the stakeholders, especially customers. So organization has to have strategy how keep knowledge itself. There are two complementary ways to do it. First one is done by converting the tacit knowledge to a more explicit form, like documents, processes, databases etc. Second approach is to enhance the tacit knowledge flow through better human interaction. This means that knowledge is diffused around the organization and not held in the heads of people. (Tocan 2012, p. 81.)

The richest and most valuable knowledge base is in the tacit knowledge bases of personnel. Explicit knowledge bases are not even nearly in the same level of value than tacit knowledge bases. Explicit knowledge has only about 5 percentage impact to competitiveness while the rest 95 percentage is based on tacit knowledge. (Ståhle & Grönroos 1999, pp. 90-91.) The role of tacit knowledge has been raised more and more in discussion related to knowledge management and competence management. However the tacit knowledge management is a quite new phenomenon so there is not much literatures about it. Usually it is represented as a part of the knowledge management or competence management. (Virtainlahti 2009, p. 72.)

The tacit knowledge management is more than bringing tacit knowledge out, making it visible and sharing it. It is important to understand what kind of a role tacit knowledge has in an organization's and individual's operations. Tacit knowledge can show that another team is better and faster in innovation, a welder is better than the others or a sales man does a fifth more deals than the others. Why? What does the one do differently? (Virtainlahti 2009, pp. 74-75.) For solving this organizations should acknowledge the need for developing of tacit knowledge, identify an essential tacit knowledge and the holders from the organization and encourage for its sharing. Thus according to Virtainlahti (2009, pp. 74-75) professionals could work better using both the visible knowledge and tacit knowledge and also create new tacit knowledge. By creating new knowledge organizations can respond to the fast changing challenges. (Virtainlahti 2009, pp. 74-75.)

Tacit knowledge management has to understand that the knowledge which is needed for success is rooted deep in individuals. It is important to understand that it cannot unambiguously transfer to explicit form without losing an essential part of it. There should be balance in the tacit knowledge management between knowledge, which can be bring out and transfer to explicit (e.g. by documenting) and knowledge, which in turn needs personal experience and presence of a master so it can be shared (partly in tacit form) from individual to other. (Virtainlahti 2009, p. 74.)

Knowledge management can be seen as a process of which goal is to optimize an effective application of intellectual capital to achieve objectives. The challenge is to discover and capture tacit intellectual capital which is contained in people, share this capital through organization and leverage corporate capital which is visible or explicit. (Tocan 2012, p. 79.)

According to Davenport & Prusak (1998) knowledge management projects have three aims:
1) to make knowledge visible and make the role of knowledge clear for everyone,
2) to develop a knowledge-intensive culture in the organization by encouraging knowledge sharing and proactively seeking and offering knowledge, and
3) to build a knowledge infrastructure by giving people space, time, tools and encouragement to interact and collaborate.

Hansen et al. (1999, pp. 106-116, 187) tell about two knowledge management strategies: codification and personalization. Codification means identifying, capturing, indexing and making available explicit knowledge. Personalization on the other hand is a strategy for providing creative problem solvers. These individuals solve problems with tacit knowledge by identifying and communicating effectively with other experts. (Hansen et al. 1999, pp, 106-116, 187.) The codifying strategy is a technology-oriented knowledge management approach whereas the personalization strategy is more like a human-oriented knowledge management approach. Particularly an approach which focuses too much in the externalization of knowledge has been criticized often. It is better to focus both strategies and those organizational and IT tools that bridge that gap between these strategies. (Maier 2010, p. 595.)

Personalization for the tacit knowledge means a strategy which happens between people. Intended results for an organization are unique, appropriate, creative solutions to strategic problems. The wanted result is to exploit opportunities and contain future costs and risks. The goal of knowledge management is the sharing of tacit knowledge by helping staff to identify relevant experts and enhance conversations to create novel solutions. Typical knowledge management tools and techniques are online CVs, a list of skills and publications for staff and external experts, e-mail discussion lists, regular case meetings, workshops and road shows, video-conferencing, co-locate staff, provided coffee area and staff secondments. Personalization demands modest IT and the knowledge management investments because of improved frequency and a quality of communications. But there may be some problems to get experts to use the system so there has to be planned encouragement. It can happen e.g. by rewarding direct communication or being contacted by others or by recognizing experts and original solutions. (Hansen et al. 1999, pp, 106-116, 187.)

Knowledge management cannot be confined by departments such as human resources or information technology but is linked closely with strategic decisions made by senior professionals and policy makers (Wyatt 2001, p. 8). Tacit knowledge is related to organization management because it includes a lot of knowledge which is relevant to organization's operation and survival (Virtainlahti 2009, p. 73).

According to Virtainlahti (2009, p. 74) and also Ramanujan & Kesh (2004) there are common factors, which are combined when talking about the tacit knowledge management:

- the organization has to know what kind of know-how it has
- the organization has to know, who has this know-how
- the organization has to indentify the potential of knowledge
- the organization has to understand, why the meaning of knowledge is important for business.

Figure 3.1 gathers together and presents the components which effect on the tacit knowledge management.
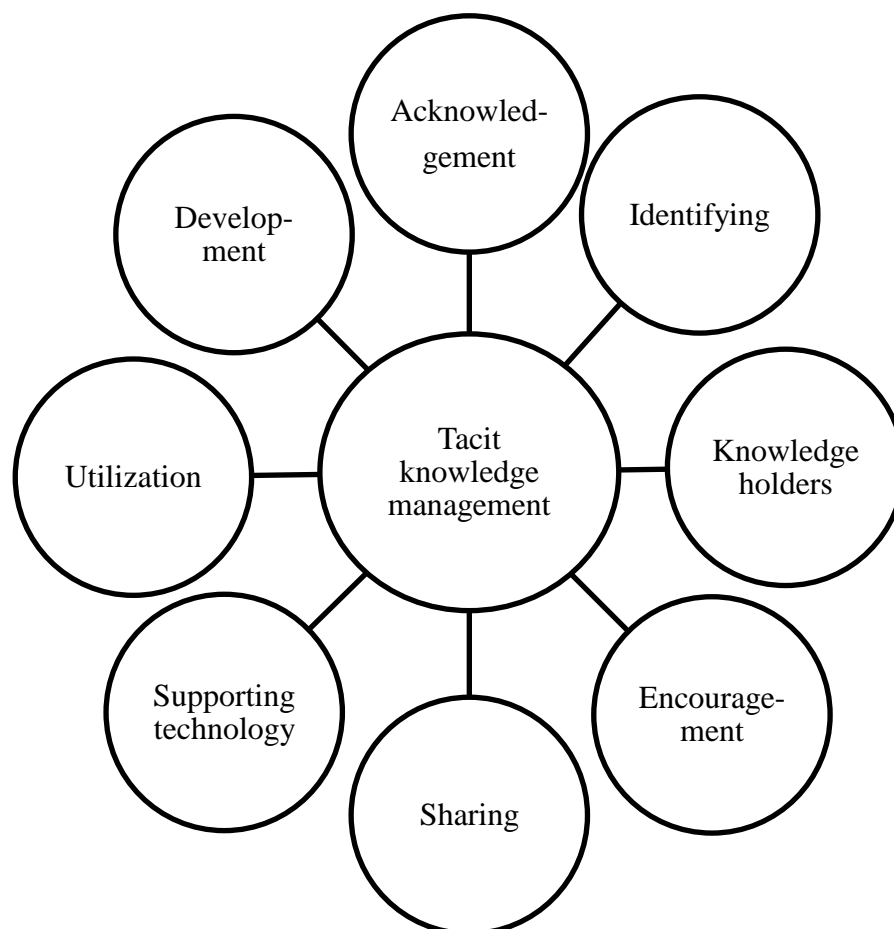
Figure 3.1*. The components of tacit knowledge management.*

3.3 Acknowledgement and indentifying of tacit knowledge

The first step in the tacit knowledge management is to acknowledge the meaning of tacit knowledge and the identifying of tacit knowledge. The tacit knowledge cannot be shared, developed or utilized if it has not first been acknowledged. (Virtainlahti 2009, p. 81.)

3.3.1 Acknowledgement of tacit knowledge

Tacit knowledge management starts from its acknowledgement (Virtainlahti 2009, p. 81). Superiors and management should stop to think what kind of tacit knowledge management culture they have in their organization. Virtainlahti (2009, p. 81) suggests that they should think how the organization reacts to the knowledge and is formal education more respected than workmanship which is accumulated through experience? How does respect and knowledge acknowledging show in practice in the working community? (Virtainlahti 2009, p. 81.)

Appreciation is the keyword when talking about the acknowledgement of tacit knowledge. The appreciation starts from the individual and the appreciation of his own skills. The appreciation of others' know-how and knowledge begins when the person understands the meaning of his own workmanship and is aware of that others knowledge complete the totality. The appreciation of own tacit knowledge is part of a healthy self-esteem where the person acknowledges and identifies his own knowledge and skills. People often understate their own know-how and knowledge. The problem usually is that people cannot acknowledge their know-how and knowledge and that is why they cannot also appreciate it. If own work and skills are opened and brought visible it lifts up professional self-esteem and the employee sees the real level of his knowledge. Superiors have specially the responsibility to bring out the know-how and knowledge but also the holder of knowledge has to take care of that. (Virtainlahti 2009, p. 82.)

Sometimes the problem can be that the person emphasizes his own know-how and knowledge too much. Then the understanding of own knowledge state can be incorrect and in the worst scenario the person gets in the situation where he does not have enough skills to handle it. The other scenario is that the person tries to do everything by himself and he does not utilize others' knowledge. Then the result might be a burnout. (Virtainlahti 2009, p. 82.)

When person knows his skills and appreciates them realistically he also has the resources to view others' know-how and knowledge. One can explore others' work and

skills by doing, hearing and following. One good way to improve the appreciation of professional skills is to tell for e.g. in meetings what kind of tasks every department has. The presentation should include also conversation so everybody can give opinion and possible development proposals. (Virtainlahti 2009, pp. 82-83.)

Organization culture creates the framework how the knowledge is appreciated. If the spirit of competition and jealousy dominates in the organization, the appreciation of own and others' know-how is impossible. Then the coping in competition is the only important thing. Employees might even understate others' know-how and knowledge while they emphasize their own status. The knowledge is often pledged in this kind of situation because employees are afraid that others might copy their best practices. So it is very important that organizations have an atmosphere where everybody's know-how and knowledge is brought out and it is understood that the products, services and business arise only by utilizing everyone's best knowledge. The organization's operations improve in cooperation and the possibilities to cope with competition gets better. (Virtainlahti 2009, pp. 83-84.)

Also the appreciation and utilization of diversity is related to the acknowledgement of tacit knowledge. Every working community has people with different stages of career, different ages and different backgrounds and they all have a different kind of know-how and knowledge. It is the management's and superiors' task to make from this diversity the power of working community. The identifying of diversity is the basis for its utilization. People who are in different stages of career can complete each other's know-how; the older employee can bring his own know-how to the conversation while beginner brings new ideas and the newest theoretical information from school. Employees from different ages can bring balance to the working community. Organizations need the enthusiasm of youth and the willingness to do also the routine jobs, and on the other hand the experience of aging employees and their opinions and long term professional skills. Organizations should also utilize the multicultural backgrounds of employees. Cultural collisions often force to rethink the old views and approaches. It is possible to combine the different characteristics of cultures and create a new approach where everybody's strength is utilized. (Virtainlahti 2009, p. 84.)

3.3.2   Identifying of tacit knowledge

The identifying of tacit knowledge is an important stage because without it is difficult to proceed with tacit knowledge management. The concept of tacit knowledge is a little indeterminate and difficult to handle. That is why the indentifying of tacit knowledge has turned out to be tricky. (Virtainlahti 2009, p. 85.) The problem is often that organizations do not know what it really knows. Too frequently people in one part of the organization reinvent the wheel or fail to solve customer's problem even when the knowledge is already somewhere in the organization, because people do not know about it or they do not have access to it. (Tocan 2012, p. 80.)

By comparing organization's performance to industry generally, a cap can be noticed the organization and the industry in terms of knowledge that a organization should have to survive among competitors. Organizations should indentify what knowledge they have so that they can remove the existing gap. (Rahimli 2012, p. 40.) The most challenging thing in the identifying of tacit knowledge is that the holder of knowledge does not usually identify his own knowledge. The tacit knowledge means in practice those things that happen by automatically. The professional knows what to do but he cannot open or describe his doings to others. The identifying of tacit knowledge from person's own action demands a new way of thinking. It can happen by asking one's self what one can do, what one knows, how one knows, how one does and from who one can ask help. (Virtainlahti 2009, pp. 85-86.)

Unfortunately the tacit knowledge is not often identified until it has already been lost. The identifying and bringing out of tacit knowledge is important so that the essential knowledge will not disappear but it can be utilized and shared with the whole organization. The identification is in the responsibility of holder and superior: the superior can guide the experts to bring out their knowledge in different ways. (Virtainlahti 2009, p. 86.)

Bringing out tacit knowledge in a difficult economic situation is challenging. Many companies have had to do personnel reductions or the threat of it exists. Everybody wants to keep their own know-how and knowledge in an unsure situation. With this kind of behavior the employees try to protect their own position in the organization so that they could avoid terminations. It is said that the tacit knowledge is secret weapon or ace up one's sleeve which will be reveal if the game gets too hard. (Virtainlahti 2009, pp. 86-87.)

People are scared that the sharing of knowledge would strengthen other's position. The employees' biggest fear is that by bringing out the knowledge they become useless. At first this kind of thinking seems very logical and understandable. However, the reality is that organizations need every employee's knowhow and knowledge to survive in the unsure situation. All the essentials issues, which are related to the maintenance and developing of business, are related to the tacit knowledge also. That is why the bringing out of tacit knowledge for all organization's participants strengthens the whole organization and makes the survival in the strained market possible. (Virtainlahti 2009, p. 87.)

It is important for organizational performance to focus on relevant and critical tacit knowledge. Critical tacit knowledge is knowledge which without the performance of organization will have difficulties. It is special know-how and knowledge from essential issues for business. So the organization should study what kind of competence there is and who has it. Particularly important is to identify the areas of know-how and

knowledge which only one or a couple of persons have. There should be a plan for ensuring the critical tacit knowledge stays in the organization. It is important who has the knowledge and how the sharing is ensured. Ensuring the sharing of knowledge is particularly important, when elimination of the knowledge would cause decreasing of performance in the organization. If organizations want to ensure the continuity of their business there cannot be any issue held by only one person. (Virtainlahti 2009, pp. 88-89.)

Virtainlahti (2009, pp. 102-103) tells about the case where a manufacturing company found what importance the identifying and sharing of knowledge has. The maintenance of machine's blades had a central position in company's manufacturing. There was only one person who had maintained the blades during the decades. He had become very skilled during his long career. The blade master had a substitute who helped when needed. The substitute had the basic skills for the tasks but not anything that master had because he was so seldom needed. However, there happened an accident to the master and he could not return to the work life. The substitute had to take master's place immediately so there was no interruption in the manufacturing. The master's advices were not available anymore so the substitute often met situations where he did not know what to do. He had no choice than to try different techniques and increase knowledge step by step. The experiments delayed the manufacturing substantially so the company had to hire another employee to work with blades. After this the substitute and his new colleague increased their experience together, little by little and by doing mistakes, until the maintenance of blades was finally at the same level than it was when the master was working. (Virtainlahti 2009, pp. 102-104.)

In this case the knowledge of maintenance was only under the master's control. The organization did not think that the sharing of knowledge was required because the master had the work years sstill left and the substitute was needed only occasionally. However the surprising accident changed the situation entirely. The knowledge about the blades was known to be important to the manufacturing but not until it's appreciation rose to the right level. When there was not knowledge anymore, it was understood what they had lost. The company could have also utilized the master's knowledge. The master could have supported the substitute e.g. via phone in the most difficult situations. Or if the master would have been able to guide the substitute only even couple of hours. (Virtainlahti 2009, pp. 103-104.) This case shows the importance of identifying and sharing of tacit knowledge and every company should learn from this and develop their performance if needed.

3.4   Sharing of tacit knowledge

Successful knowledge management relies heavily on knowledge sharing (Hasssandoust & Kazerouni 2011; Virtainlahti 2009, p. 107). A new knowledge begins always from an individual. But it is not possible to create the new knowledge in an organization level if

there is not any interaction between individuals. The knowledge of individuals and its developing is important but if the knowledge is not shared in the working community, it is very difficult to create the common best practices. (Virtainlahti 2009, p. 107.) Knowledge sharing is a very important area for knowledge management because it provides a link between the level of individual knowledge workers, where knowledge resides and the level of organization, where knowledge attains it value for the organization (Hassandoust & Kazerouni 2011).

Tocan (2012, p. 80) writes about international best practice study which showed that there is a strategy for maximizing the returns on their knowledge asset. It happens by utilizing the existing knowledge better e.g. by sharing best practices. (Tocan 2012, p. 80.) The best know-how and best practices are available for every member of the working community by sharing the knowledge and it is possible to develop them further. Shared knowledge is the best knowledge and it increases members' knowledge. The possibility to respond to challenges created by the environment gets better by developing know-how. (Virtainlahti 2009, p. 107.)

The organizational culture has a huge impact if knowledge is shared. Bad atmosphere and jealousy can effectively prevent the sharing of tacit knowledge. If anybody does not have the certainty of own position and there is constant competition between employees, the sharing of tacit knowledge is also challenging. The building of trust and open atmosphere is very important for terminating this kind of a situation. When there is a real communication between participants it is also possible to bring out knowledge and share it. (Virtainlahti 2009, p. 88.) Knowledge sharing is a process that is managed through many modes of communication and collaboration and it distributes knowledge to members in the right time, place and form (D'Aspremont, Bhaffacharya & Grard-Varet 1998).

Always when talking about sharing the experience and approaches of experts one has to take into consideration also the power of a knowledge holder. Silence can be used as a tool of power. The silence can have either a negative or a positive impact. The positive impact occurs e.g. when important person for organization speaks in right place carefully considered points in right time. While the negative impact is related to the management of tacit knowledge, the tacit knowledge is not shared to others but it is concealed. (Virtainlahti 2009, p. 88.)

3.4.1   SECI model

SECI model is a knowledge creation process model but it describes also well the four steps of knowledge transforming from the tacit knowledge to explicit knowledge and once again to tacit knowledge. The four steps are socialization, externalization, combination and internalization. The name of comes from the first letters of the steps. The model is based on the knowledge conversation, more especially on the interaction be-

tween tacit and explicit knowledge. Figure 3.2 shows the four modes of knowledge conversation and also the continuance of the model. (Nonaka & Takeuchi 1995, pp. 61-62.)
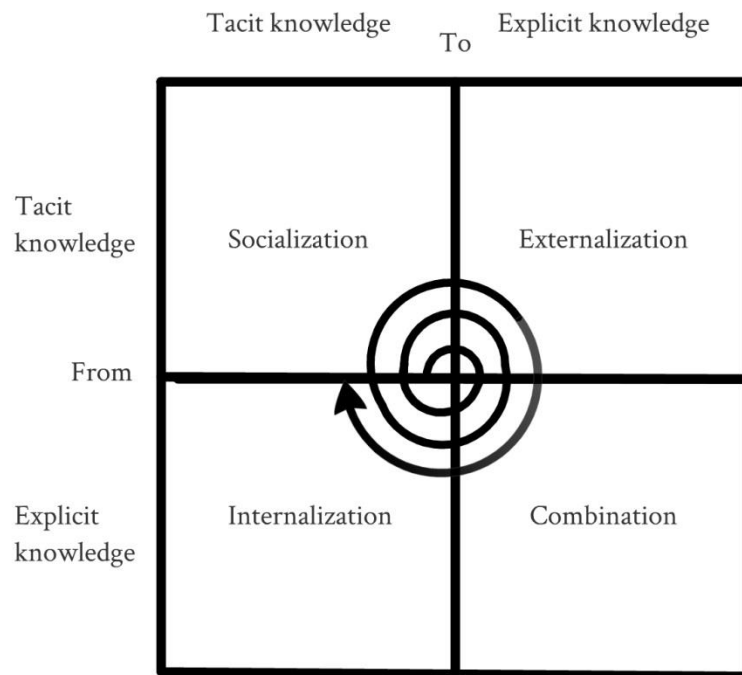
Figure 3.2. *The SECI model (adapted from Nonaka & Takeuchi 1995, p. 62).*

Socialization is a process where experiences are shared and thereby also tacit knowledge is created. It can happen by sharing mental models and technical skills. It is possible for an individual to acquire tacit knowledge directly from others without using language. This can happen by working with masters and learning craftsmanship through observation, imitation and practice. On-the-job training uses the same principle. The acquiring of tacit knowledge needs shared experience. Without some form of it, it is very difficult to understand another individual's thinking process. (Nonaka & Takeuchi 1995, pp. 62-63.)

Nonaka & Takeuchi (1995, p. 63) give three examples of socialization. First one comes from Honda which set up "brainstorming camps". They are informal meetings for solving difficult problems in development projects. The meetings are arranged also in an informal place, like in a resort inn where participants can discuss problems while they are drinking sake, eating meals and swimming in a hot spring. The meetings are open to any employee who is interested in the subject. The discussions are very open and the only rule is that there cannot be criticism without constructive suggestions. The camp is not only a great place for creative dialogue but also a place to share experience and enhance mutual trust between participants. It is very an effective way to share tacit knowledge and create new perspectives. The method reorients the mental models of

participants in the same direction but the changing is not forced. (Nonaka & Takeuchi 1995, p. 63.)

The second example of socialization comes from the Matsushita Electric Industrial Company. The company needed tacit knowledge from master bakers to build an automatic home bread-making machine. They tried to x-ray the dough kneaded by a master baker and by a machine but there were not any meaningful insights obtained. The company knew that the best bread came from the Osaka International Hotel so to capture the tacit knowledge of the kneading skill they sent several engineers for apprentices to the hotel's head baker. But it was not so easy to make the same delicious bread as the head baker and nobody could explain why. However, one day one of the engineers noticed that the baker was not only stretching but also twisting the dough and this turned out to be the secret of tasty bread. So the engineers socialized the baker's tacit knowledge through observation, imitation and practice. (Nonaka & Takeuchi 1995, pp. 63-64.)

The socialization can also occur between an organization representative and a customer. The interaction with customers is a very good place to share tacit knowledge and creates ideas for improvement. This is actually a never-ending process and it can give valuable knowledge e.g. for product developers. The third example is about NEC who developed its first personal computer utilizing this kind of process. NEC got feedback from a wide variety of customers, from high school students to professional computer enthusiasts and shared experiences with them. The result was that NEC developed the best-selling personal computer a few years later. (Nonaka & Takeuchi 1995, p. 64.)

Externalization is a process where the tacit knowledge is articulated into explicit knowledge. This is the knowledge-creation process where the tacit knowledge becomes explicit by taking the shapes of metaphors, analogies, concepts, hypotheses or models. However the expressions are often inadequate and insufficient. These discrepancies and gaps between real situations and expressions help with reflection and interaction between individuals. (Nonaka & Takeuchi 1995, p. 64.)

The externalization is typically the process of concept creation and it is realized by dialogue or collective reflection. It is frequently used to create a concept by combining deduction and induction. When it is not possible to find an adequate expression through analytical methods of deduction or induction, a non-analytical method has to be used. Then the externalization is often driven by metaphor and/or analogy. An attractive metaphor and/or analogy are very effective when trying to foster direct commitment to the creative process. (Nonaka & Takeuchi 1995, pp. 64-65.)

From the four modes of knowledge conversation, externalization is the key mode for knowledge creation, because it creates new, explicit concepts from tacit knowledge. The efficient tacit knowledge converting into explicit knowledge is not easy but it is possible

to do by using metaphors, analogies and models. By using metaphors it is possible to create a new interpretation of experience and to give the listener the possibility to see one thing in terms of something else. Analogies help us to understand unknown by using the known and bridging gaps between an image and a logical model. After explicit concepts are created, they can be modeled. In business terms models are often only rough descriptions or drawings. Models are usually built from metaphors and while new concepts are also created in business context. (Nonaka & Takeuchi 1995, pp. 66-67.)

Combination is a process where the concepts are systemized into a knowledge system. The combination happens between different parts of explicit knowledge. Individuals do knowledge exchanging and combination through documents, meetings, telephone conversations and communication networks. Sorting, adding, combining and categorizing of existing, explicit knowledge can lead to new knowledge. This process is utilized in formal education and training at schools. In the business world, the combination process is often seen when middle managers operationalize corporate visions, business concepts or product concepts. The middle managers have an important role in creating new concepts from codified knowledge. Creative use of communication networks and databases support combination process. (Nonaka & Takeuchi 1995, pp. 67-68.)

Kraft General Foods manufactures dairy and processed foods. It is using combination by utilizing data from the point-of-sales system of retailers and not only for finding out what does and what does not sell well but also by creating new "ways of selling" and based on that providing new sales systems and methods. The company has developed an information-intensive marketing program which provides recommendations for supermarkets on the optimal merchandise mix and with sales promotion. This individual method of data analysis makes it possible to pinpoint who shops and where and how. (Nonaka & Takeuchi 1995, p. 68.) The process of combination creates valuable information for the company and enables better success.

The fourth mode of SECI model is internalization which is a process where explicit knowledge transforms into tacit knowledge. The process is closely related to "learning by doing". The internalization is easier if the knowledge is verbalized or diagrammed into documents, manuals or oral stories. Documentation also helps the documenter to internalize what a person experienced by enriching also his tacit knowledge. Documents and manuals also make the transfer of explicit knowledge easier to other people by helping them experience the experiences of others indirectly. E.g. GE documents all the customer complaints and inquires in a database so that e.g. the members of a new-product development team can "re-experience" what the telephone operators experienced. GE has documented 1.5 million potential problems and their solutions into database and any problem-solution response can be retrieved in two seconds. If the case solution is not available, specialists resolve the problem on site and after that solution will be put into the database. (Nonaka & Takeuchi 1995, p. 69.)

Internalization can also happen without having actually "re-experience". E.g. when person is reading or listening to successful story and it makes the person feel the realism and essence of the story. Thereby the experience which happened in the past may change into a tacit mental model. When this kind of a mental model is shared by most members of the organization, tacit knowledge becomes part of the organizational culture. (Nonaka & Takeuchi 1995, pp. 69-70.)

Virtainlahti (2009, p. 101) summaries the modes of the SECI model in a following way. Socialization includes shared mental models or technical skills. Externalization produces conceptual knowledge. Combination in turn brings out comprehensive knowledge, like a prototype. Internalization produces operational knowledge from product management, manufacturing process etc. Individuals' personal tacit knowledge is the base of creating knowledge in an organization and organization has to get it to use. Thereby an organization should offer its employees a working environment which enables group working and both knowledge creation and gathering. (Virtainlahti 2009, p. 101.)

The four different modes of the SECI model are relevant in terms of sharing tacit knowledge. Tacit knowledge is transmitted from employee to another by socialization: traditional master-apprentice-model is used in many industries for tacit knowledge sharing. Also externalization is needed so that all the sides of tacit knowledge that can be expressed in visible form can be recorded. Different tasks and parts of them can be documented as manuals, descriptions and check lists. On the other hand also stories which move from employee to another employee can describe experiences related to organization's history, future and persons. Learning by doing, which is internalization in the SECI model, is in an essential role when transmitting tacit knowledge. (Virtainlahti 2009, p. 101.) The modes of the SECI model create framework for the sharing of tacit knowledge management which otherwise can be difficult to approach.

3.4.2 Motivation for knowledge sharing

Organization needs the bringing out and sharing of know-how and knowledge for building its future. Know-how and knowledge developed at a workplace is not people's personal property and employer has the right to demand employees to share it others. Individuals have possibilities to develop their own know-how by working and update their theoretical skills by doing trainings. Organizations should be able to get a part of these investments also as a shared knowledge. (Virtainlahti 2009, p. 108.)

When person shares knowledge to others, knowledge becomes visible also to himself. The opening of own know-how and knowledge makes it easier to develop knowledge further. It is not rare that a superior does not know precisely what his subordinates do and what kind of knowledge they have. When making work visible a superior's awareness about his subordinates become wider and thus comprehensive planning becomes

easier for the superior. Sharing knowledge also contributes the planning and implementing of career paths. Shared knowledge improves all members' knowledge and organization has better possibilities to maintain and develop its operations also in future. By sharing knowledge it is possible to utilize everyone's input in the working community and develop the ability to react for surprising situations. (Virtainlahti 2009, pp. 108-110.)

The sharing of tacit knowledge fosters sharing of best practises. Best practises ensure that work runs smoothly. They reduce mistakes and make sure that quality stays the same and also that there is possibilities to improve quality. Shared best practises facilitates working when there is no need to learn everything from scratch but it is possible to share good and tested approaches for everybody's use. The utilization of best practises saves also time. (Virtainlahti 2009, p. 109.)

It is very important to share the tacit knowledge when personnel are changing. This way it is possible to ensure that knowledge stays in organization. When the tacit knowledge is managed well, personnel changes are controlled. The tacit knowledge is in danger to disappear in every kind of personnel changing situations: sick leaves, maternity leaves, alternation leaves, terminations, workplace changes and retirements. The effects are shown in an organization's functionality and quality. (Virtainlahti 2009, p. 109.)

Personnel's coping at work is related also to the sharing of tacit knowledge: often people have a lot of tasks and they may do hundreds hours of overtime. If many people can do the tasks, one person do not have to do all by himself and it is easier to get help. Thereby it is possible to reduce the personnel's stress level and improve wellness. However it may often be that people do not want to share their knowledge because they are feeling that they are particularly important and priceless for organization. But it is important to remember and remind everyone that a person's know-how and knowledge does not decrease when sharing it. When coping gets better and stress level decreases, the person can focus on developing own know-how. (Virtainlahti 2009, p. 110.)

When there is shared knowledge in an organization, community spirit also gets better. When all the members of a community share their knowledge, openness and communication increases. People engage common goals and do co-operation. When someone shares own knowledge, the person gets also back new knowledge. People are sharing knowledge because they really want to help each other and the open atmosphere encourages also ask for help. People need to also be critical when they are learning from others: learnt knowledge is not always the best knowledge but it can be a base when developing new. (Virtainlahti 2009, pp. 110-111.)

Earlier the tacit knowledge was a precaution for keeping a person's own position. Masters sent apprentices away when they did most difficult and the most tacit knowledge

needed tasks. The apprentice might take years to learn the methods independently and in a hard way. During the decades the policy of restricting knowledge has decreased. Organizations have begun to understand that skilled members of working community enable the coping of organization in the tightening market. The sharing of knowledge is power in today's working community, not the hiding knowledge. The organization cannot keep employees who keep knowledge to themselves. The most valuable employees are people who share and develop their knowledge. The sharing of knowledge is a trade where both parties get new knowledge and thus can improve their own know-how. The sharing of knowledge increases transparency and thus improves predictability. The transparency and predictability builds and maintenances a trustful atmosphere which contributes again the sharing of knowledge. (Virtainlahti 2009, p. 111.)

There are multiple advantages in tacit knowledge sharing (Virtainlahti 2009, p. 108). Knowledge sharing can increase efficiency and save on work hours if an organization can learn from the past experiences and avoid the duplication of effort (Weiss 1999, pp. 61-77).

The tacit knowledge should be shared so that
- the performance, continuity and quality of an organization can be ensured
- know-how and knowledge becomes visible and it can be developed
- work tasks become visible and they can be developed
- it is possible to share with everyone
- different knowledge can be utilized
- the welfare of a working community gets better
- community spirit can be fostered
- an atmosphere that appreciates know-how can be created
- the sharing of knowledge can be made a matter of honour and positive obligation. (Virtainlahti 2009, p. 108.)

Also, if an organization can add some basics elements of good human resource management, including a stimulating environment, personal development plans, motivation and suitable reward and recognition systems, like knowledge sharing awards and stock options, organization has better chance to keep the best knowledge workers (Tocan 2012, p. 81).

3.4.3 Methods for sharing and developing of tacit knowledge

It is possible to ensure the sharing of knowledge between the members of a working community by utilizing different methods. There methods are shown in Figure 3.3. Methods have been divided based on different classifications: are they focused on individuals or the working community, are they formal and standard situations or informal and situation-based. (Virtainlahti 2009, p. 116.)

Informal, situation-based

```
                    coffee breaks and other informal meetings

          self-learning
                                        problem solving situations
    learning from example      teams
          specific tasks                              dialog

                          exchange of experiences

    extension of tasks    networks                 meetings

                                        co-operation in planning
    work guidance    precedences

    mentoring              benchmarking
            job rotation                experimentation
                         online learning
    tutoring, coaching                        assessment
    orientation programs
            development discussion          development projects

                          training programs
                          training sessions
```

Individual level — Working community level

Formal, standard situations

Figure 3.3. The methods for sharing of know-how and knowledge (adapted from Vir-tainlahti 2009, p. 117).

Next the methods are introduced by category in following order, like Virtainlahti (2009, p. 116) has done in her book:

- the forms of co-operation which foster the sharing of knowledge
- the forms of work development which support the sharing of knowledge
- human resource activities which foster sharing and developing of knowledge
- informal practices in the sharing of tacit knowledge.

The forms of co-operation which foster and support the sharing of knowledge are according to Virtainlahti (2009, p. 118, 125):

- teams
- mentoring
- master-apprentice-model
- senior-junior-work pair
- substitute arrangements
- networks
- exchange of experiences
- reflection

- dialog
- office arrangements.

The teams are generally used for arise interaction between the members of a working community and thus contribute to the transmission of knowledge and know-how. The teams are self-directed working groups i.e. groups of people which are responsible for the handling of some agreed entirety from start to finish. The teams can be permanent or temporary founded for some project or mission. The teams need all the knowledge and know-how of their members to achieve their goals. The teams can develop common know-how by sharing everyone's knowledge with each other. The sharing happens by using "conversations of knowledge" i.e. interaction of tacit and explicit knowledge. The knowledge is specified through dialogues, conversations, experiences and observations. (Virtainlahti 2009, pp. 118-119.)

The mentoring is a popular method for the sharing of knowledge and know-how. It means that a skilled, experienced and appreciated, senior level person provides guidance for a person who has willingness to develop and wants guidance and support in questions related to the work. The mentoring is a bilateral interaction which is based is in openness, trust and commitment. The goal is to promote and support person's professional know-how and qualification. It is important to notice that both participants develop in mentoring. The mentoring is a good method for the sharing of tacit knowledge because it creates a possibility to convey values, attitudes, norms, principles and habits which rule in an organization and the industry. It enables the transmitting of working community's experiences and history and their insights from the current state and future. (Virtainlahti 2009, pp. 119-120.)

The master-apprentice-model and senior-junior-work pair is in Figure 3.2 under the concept 'learning from example'. The master-apprentice-model has been used through the ages for the sharing of tacit knowledge especially in factories. The apprentice follows the experienced master working and learns by observing and imitating. Traditionally the apprentices have adopted the master's actions as such including good and bad practices without critic. But it is important to examine critically both the master's and the apprentice's point of view. (Virtainlahti 2009, p. 121.)

The senior-junior-work pairs are used especially at industries where long careers in the same organization are typical. In the industries knowledge and know-how is accumulated for the senior level members of a working community. It is possible to convey this knowledge to the juniors by forming work pairs from persons who are in different stages in their careers. The seniors can convey knowledge both from the organization's history and the job itself. An organization should overall try to achieve a stage where people, who are in different stages of careers, can exchange knowledge. It is important to notice that experimented knowledge is not related to age. Also the younger employee

can have a lot of experimented knowledge from some working area. (Virtainlahti 2009, p. 121.)

Substitute arrangements ensure the continuation of the work in different absence and turnover situations. Every worker should have a substitute who can handle needed basic tasks related to the job. The substitutes are often in the same team or work pair or unit. It is good practise to document the substitutes so the roles are clear for everyone. The substitute arrangements support also the transmitting of tacit knowledge when more than one person can do the same job and there is job related knowledge sharing all the time inside the pair or team. The substitute arrangements ensure that there remains knowledge for essential and critical jobs. (Virtainlahti 2009, p. 122.)

One way to promote knowledge sharing is to create different networks. The networks can be both internal and external organizations. (Virtainlahti 2009, p. 123.) In a dynamic company environment the borders of organization blur: subcontractors and partners form a complicated network. There are lot different core competencies which are engaged for new professionalism, performance and products. (Ståhle & Grönroos 1999, p. 102.) Working communities have different informal networks which have been formed through interaction. Often working communities' veterans have already created different networks which they use to get the right know-how and help. This knowledge is not documented anywhere. There should be possibilities for employees to form networks by creating situations where they can co-operate also over departments. E.g. company's more casual events are good places to get to know colleagues and other members of a working community and thus they also create a base for co-operation at work. External networks can be essential partnerships for an organization. The external networks can be a link which is used for reflecting and getting new ideas and new knowledge. Networking is possible nowadays also through different forums. (Virtainlahti 2009, p. 123.)

The exchange of experiences is a situation where participants exchange together their experiences related to the job. Many employees can participate in an exchange and it is possible also to invite visitors from retired persons. The goal is to share experience from specific topics related to jobs through conversation. The exchange of experiences is a good way to share knowledge and build together new knowledge. The experiences are often shared in the form of story which helps the participants remember them easier. The best solution is if it is possible to collect a wide range of experiences together and create new best practises. Usually conversations are not documented but by documenting the conversations could be utilized wider in the organization. (Virtainlahti 2009, pp. 123-124.)

New understanding comes from reflection (Stenmark 2002). Reflection works well in the sharing of tacit knowledge. Performance can be reflected at same time or afterwards. Reflection during performance happens by questioning the performance and creating

new ways of acting and thinking. (Virtainlahti 2009, p. 124.) The reflection during the performance is challenging and it always demands interrupting action and thinking breaks. Reflection afterwards happens by assessing the occurred. (Stenmark 2002; Virtainlahti 2009, p. 124.) The reflection, which is done by a dialogue, can benefit greatly from it because the dialogue means articulating and making tacit understanding explicit. This is best done in a face-to-face situation but virtual meetings may provide a viable substitute. (Stenmark 2002.) A critical reflection questions also own prior expectations, examines past events and incidents. By doing reflection it is possible to identify a success and failure and share experiences related to them to others. Reflection makes it possible to prepare to different situations when it is known how some situation have been resolved before. The reflection can also create new ideas and it can be done both alone and in a group. (Virtainlahti 2009, p. 124.)

The dialog means a deep and real interaction. It differs from conversation by emphasizing different insights, understanding and consensus. The dialog means open conversation by considering, assessing and reflecting own and others ideas. The dialog supports a workable interaction and the sharing of knowledge. A deep discussion and questioning helps bring the best practice out and develop performance further. The dialog is a prerequisite for learning and thus closely related to the sharing and developing of knowledge. (Virtainlahti 2009, p. 125.)

Office arrangements impact essentially to the members of a working community and their mutual interaction. There should be focus on how workstations are physically organized. The office arrangements impact to the sharing of knowledge by contributing or preventing. Does the work happen in an open office or does everyone have own offices? Does a work pair share a room or is their rooms close together? Is it easy to get a forum for communication? Do the members of a team have workstations close together? Closed single offices encourage for independent working, and there can be less interaction, which is essential for the sharing of knowledge. However, the office arrangements have been done, it is essential to ensure that employees have a possibility for interaction. Nowadays a communication forum can be arranged also by utilizing digital techniques, like social media. (Virtainlahti 2009, pp. 125-127.)

The forms of work development which support sharing of knowledge are according to Virtainlahti (2009, p. 127):
- job rotations
- expansion and enriching of job
- participating in projects
- benchmarking
- documented knowledge.

Job rotation means that an employee changes the job inside the organization for an agreed time, agreed way and returns to doing his own job at the end. The goal is to get experiences and develop versatility. Job rotation also increases the variability of work and prevents fatigue. Knowledge is transmitted to both directions in job rotation: to the new job with employee and back to the old one also. The overall management is an essential component of tacit knowledge. When you see your own job from another perspective, it increases knowledge about your own job and you see the whole organizations performance in a new way. The job rotation contributes also to the creation of networks. (Virtainlahti 2009, pp. 125-127.)

The expansion of job means a process where an employee does different level stages of the same job. The same level jobs are combined in the process direction. A horizontal expansion increases the variability of job. The expansion of a job increases professionalism because it demands often additional training to respond for new challenges. Thus one part of expansion is also learning new skills. The enrichment of a job means a vertical expansion of job. The enriching increases complexity and independence of the work. The enriching can be done by giving more responsibility for the employee. Both the expansion and enriching of a job develop the know-how and knowledge of an employee. The development of professionalism creates new tacit knowledge and deepens the existing knowledge. (Virtainlahti 2009, p. 128.)

The participating in projects develops the know-how and knowledge of a participant and the whole group. E.g. a successful project needs the knowledge from all members of the project. By bringing out and combining tacit knowledge it is possible to create innovations and new practises which allow the development of organizational performance. All the members of a group can learn from the newfound knowledge. (Virtainlahti 2009, pp. 128-129.)

The benchmarking is a method where one's performance is compared to an industry's best performance. However comparative data can also be found from other industries. The goal is to find the best working practise from which something can be learnt. Benchmarking is one way to learn from others. When it is possible to see the best practises in action in another organization, it helps also to adopt them to the own performance. Usually the benchmarking is realized as a whole organizational learning not only as a benchmarking of one person. However a successful benchmarking can create changes also in individual performance. (Virtainlahti 2009, p. 129.)

The documented tacit knowledge makes possible to share knowledge further in an organization. People are often very critical on own knowledge and they feel that only special knowledge can be useful for others. However, someone's self-evident knowledge can be very valuable knowledge for others. That is why the documentation of knowledge is recommended. When someone brings out knowledge in written or visual

form (e.g. pictures, videos), it helps other members of organization consider their own work, work related knowledge and the sharing and developing of knowledge. (Virtainlahti 2009, pp. 129-130.) More about documentation has been written in the chapters 3.3.2 The indentifying of tacit knowledge and 3.4.1 SECI model.

The human resource activities which foster the sharing and developing of knowledge are according to Virtainlahti (2009, p. 130):

- recruiting
- orientation
- guidance for work
- trainings
- performance appraisal.

Recruiting is one way to update know-how and knowledge of an organization. When doing recruiting, the needs of organization have to be considered. What kind of know-how and knowledge is there already in the organization and what is needed in future? When an organization recruits new people, knowledge sharing happens both ways, from a new employee to the old ones and other way around. (Virtainlahti 2009, p. 129.)

Orientation helps a new employee to get to know the organization. The orientation supports a newcomer until he can work alone. During the period the employee gets to know his new job and principles of the organization. The orientation impacts on a socialization of employee in a new working community. Experimented knowledge is learnt through socialization and that is why the orientation is a very important period in the learning process of a new employee. If a mentor indentifies his own tacit knowledge he can convey his tacit knowledge to the new employee already during the orientation period. Thus it is possible to create willingness for the new employee to share the tacit knowledge so that it would create and maintain positive organization culture and atmosphere of working community. (Virtainlahti 2009, pp. 131-132.)

Guidance for work is the part of the orientation. It helps an employee to work at a new job. The guidance does not concern only new employees but it would be implemented also when someone changes to another job inside the organization. There should be given special attention to the sharing of tacit knowledge when doing the guidance for work. Shared experienced knowledge can shorten a learning period and fasten the adoption of a new job. The guidance gives a good opportunity to share the tacit knowledge to the learning person. Also there is a possibility to create a basis for a culture which promotes the sharing of knowledge. (Virtainlahti 2009, p. 132.)

Training makes it possible to increase work related new knowledge. However it is said that ten percentage of work related knowledge is learnt at school and rest 90 percentages at work. Information received from school or trainings changes a little by little to the

knowledge when theoretical information is utilized at working. The trainings can be arranged as an organization's own courses or public trainings. It can be also required that a participant has to share the new knowledge from the training to others in the working community e.g. in the team meetings. This intensifies learning because a person has to internalize the new knowledge before he can tell about it to others. This way the new knowledge transfers slowly to the tacit knowledge of all participants. (Virtainlahti 2009, p. 133.)

A performance appraisal means a prepared meeting between a superior and an employee once or more in a year where the performance of the employee during the past year is looked over and new goals and development directions are discussed. The performance appraisal is a tool of management and it enables the bringing of visions and goals of an organization to everyday work life. The performance appraisal is a forum where experienced knowledge is assessed and the employee can be guided to develop knowledge in a needed area. There can be also highlighted some people who could have something to give to the employee based on their experiences. Meeting is a good situation for agreeing on the ways how to share knowledge forward. (Virtainlahti 2009, pp. 133-134.)

The informal practices in sharing of tacit knowledge are according to Virtainlahti (2009, p. 134):
- meeting practises
- informal meetings.

There are many options to pay attention to the sharing and utilizing of experienced knowledge in meeting practises. Already the fact that meetings are arranged regularly e.g. inside teams and departments, promotes the sharing of know-how and knowledge. The sharing of tacit knowledge can happen e.g. by going through together successful, special or problematic cases. The cases can be demonstrated with the solution and the meeting group can resolve unresolved cases together. It is possible to gather common good practises which everyone can implement in their own performance. This way cases related to the tacit knowledge can be gathered from participants and it can be utilized in concrete performance. In addition the knowledge can be shared wider. (Virtainlahti 2009, pp. 134-135.)

The informal meetings in a working community are very important for the sharing of tacit knowledge. These situations create interactions and build essential trust for knowledge sharing. In a coffee or lunch break the content of a discussion may be anything but often it includes at least something about work. It is also easier to approach a person who you have met before at break. The person shares knowledge rather with the person who he has something in common with or with whom he has had a good conversation e.g. about football than with stranger who is only in the same organization chart. (Virtainlahti 2009, pp. 135-136.)

All these methods contribute the sharing of tacit knowledge. Part of these methods happen naturally in organizational performance but others needs more attention. An organization should be aware of these methods and plan its operation so that these methods would be part of it. There should also be a suitable culture for the execution of these methods. All these methods are not suitable as such for a global company's performance. But with help of some applying and utilization of supporting technology they are also suited for global context.

3.5   Supporting technology

The development of new technologies and especially e-collaboration and communication technology has enabled new forms of interaction and collaboration. The World Wide Web gives a team the possibility to share knowledge and work remotely on a project. E-collaboration tools such as videoconferencing, group support systems, distance education tools and more commonly e-mail have developed exponentially. These tools support mainly decentralized networks of communication. The new metrics of time and distance modify human interaction from the classic network of face-to-face relationship into a network of virtual relationships. (Hassandoust & Kazerouni 2011.)

By means of software, hardware and systematic processes, knowledge is acquired and coded from converting experiences and proficiencies to explicit know-how (Hassandoust & Kazerouni 2011). Nonetheless Ramanujan & Kesh (2004) argues that the only way to capture tacit knowledge is through efficient interaction and sharing. However, according to Liam & Klobas (2000) evolution of modern technology has been increasingly interesting and called a significant attention toward knowledge management. Technology cannot display the importance of direct communication and interaction in tacit knowledge sharing but its role is becoming bigger all the time.

Most people agree that data and information can exist outside a human and these views can be supported by technology quite easily. On the other hand supporters of the community view of knowledge would argue that tacit knowledge cannot be separated from an individual and thus never stored digitally. (Galliers & Newell 2001.) This would mean that a computer support for tacit knowledge management is impossible. These supporters of the community view of knowledge claim that tacit knowledge can be explicated and turned into information which can be handled by computer. And because there are many information systems already there would not be need for knowledge management systems. (Stenmark 2002.) However Alavi & Leidner (2001, p. 114) suggest that although information and knowledge systems are not so different, there is a subtle but important difference in the attitude and the purpose of systems. When a information system processes information, the knowledge management system must help users to understand and assign meaning to the information and thereby to include the

user perspective. Regardless of perspective, IT may successfully be used to facilitate knowledge if the user perspective is included. (Stenmark 2002.)

Three common applications of IT to organizational knowledge management are according to Alavi & Leidner (2001, p. 114):
1) the coding and sharing of best practises,
2) the creation of corporate knowledge directories, and
3) the creation of networks.

One of the most common applications is internal benchmarking with a goal to transfer internal best practises. Another common application of knowledge management is to create organizational directories which map the internal expertise. The mapping of internal expertise can reveal much non-codified knowledge. The third common application of knowledge management systems is networks. E.g. when Chrysler reorganized organizational units, they realized that unless the suspension specialists could communicate easily with each other across the system, expertise would deteriorate. By providing online forums for communication and discussion networks may be created. (Alavi & Leidner 2001, pp. 114-115.)

The knowledge management systems support organizational competencies. Overall knowledge management and its application can support organizations to get important advantages against competitors (Rahimli 2012, p. 42.) The implementation of e-collaboration systems has many benefits, such as cost reduction, better service quality, and improvement in organizational effectiveness, enhanced decision-making process and transparency which will eventually benefit overall performance (Hassandoust & Kazerouni 2011). Alavi & Leidner (1999, p. 20) classifies the benefits of knowledge management systems by process outcomes and organizational outcomes. Process outcomes show in communication (such as enhanced communication, faster communication, more visible opinions of staff and increased staff participation) and efficiency (such as reduced problem solving time, shortening proposal time, faster results, faster delivery to the market, and greater overall efficiency). Organizational outcomes show in financial, (such as increased sales, decreased cost, higher profitability), marketing (such as a better service, customer focus, targeted marketing, proactive marketing) and general (such as consistent proposals to a multinational client, improved project management and personal reduction). (Alavi & Leidner 1999, p. 20.)

3.5.1 Social media tools for tacit knowledge management

Virtainlahti (2009, p. 145-148) introduces five social media tools which can be used in the tacit knowledge management:
- instant messenger
- wiki

- blog
- experts' database
- Second Life.

The instant messenger has to be installed in a workstation. A conversation happens in a real-time and it is possible to communicate with many people at the same time. It is also possible to share files, do group work and voice/video phone calls. The instant messenger works well in the management of tacit knowledge because it makes it possible to communicate in real-time using text, files videos, voice or a combination of these. Teams or a master and an apprentice can communicate via the instant messenger. It creates a more informal way of communication than the e-mail. It is easy to ask questions and share ideas. The conversation is saved so it easy to return to it later e.g. to review guides. (Virtainlahti 2009, pp. 145-146.)

Wiki is a website that can be edited by users. The wiki is an effective tool for group work because editing and communication is easy. The wiki can be used e.g. for describing some operation at work and an operation related tacit knowledge. It makes possible to produce description together. Using the wikis knowledge can be described in experts' database where everybody can get in and edit it. (Virtainlahti 2009, p. 146.)

A blog is a website where one or more writers can write. The newest texts are easily found and the old ones remain constant and readable. The blog enables users to publish text, pictures, videos and voice. The characteristic of a blog are emphasising of writing time, linking and personal perspective. The blogs often have possibility to comment and RSS- or Atom-feeds which enable the content of a blog for automatic dissemination and following. E.g. masters and experts can utilize blogs for describing some specific job related knowledge. Other members of the organization can read from blog the master's writing, comment if needed and ask advice. The personal perspective is emphasised in a blog so the chosen writer has an essential meaning for the documented knowledge. (Virtainlahti 2009, p. 146-147.)

The experts' database is application which includes know-how, jobs, contact information and projects of experts. There are also guides and documents which the experts manage. The searching of knowledge happens by using any of the mentioned criteria. The experts' database can be utilized in the management of know-how and especially a big company can get information about the employee's knowledge. But it does not actually bring out the tacit knowledge, it helps mainly to assess the level of know-how. (Virtainlahti 2009, p. 147.)

A professional acts very much through models born by intuition and experiences which are based on knowing deeply a theory and facts. All elements of knowledge form a multi-dimensional knowledge warehouse. They have internalized and thought from so many

perspectives so that the person cannot return them anymore to a detailed level. This is also a problem in the developing of an experts' system because it is so difficult to trace the experts' ideas when it includes so many indeterminate and illogical links. (Ståhle & Grönroos 1999, p. 90.)

The Second Life is a virtual world which companies can utilize for e.g. sales and marketing, customer training and virtual meetings. A user has to install Second Life Viewer in a workstation and after that he can start interaction with the other users of a virtual world by using his avatar. The avatar is user's created virtual person. The users can explore virtual world freely, meet other users and participate in individual and group activities. In a business setting the Second Life has focus on describing of knowledge, searching it and utilization. Currently only few innovation companies have built business in the Second Life and even fewer use it for training and sharing of knowledge. (Virtainlahti 2009, pp. 147-148.) Future will show if companies start to utilize virtual worlds more and if knowledge management develops there also.

3.5.2   Organization in different stages in management of tacit knowledge

There is a possibility to use both traditional information technologies and social media tools in the management of tacit knowledge. Both of these can help with documenting of knowledge and sharing it with the community. The documented knowledge enables also the effective utilization of knowledge in a business. Next utilization of information technologies and social media is introduced through four cases. These fictitious cases demonstrate organizations which are in different stages in the management of knowledge and know-how. (Virtainlahti 2009, p. 140.)

In case one, the organization has not done any actions for the identifying or describing of tacit knowledge. Guidelines are not documented and every employee has not got a possibility to get them. The organization does not have an intranet or at least every employee has not access to it. This kind of organization should start with the building of the intranet for internal use. It is not very expensive to build but it demands planning and data inputting and also continued maintaining. There can be different guidelines and job descriptions in the intranet and it is very important to give the members access to the intranet. (Virtainlahti 2009, p. 141.) Hence one of the first knowledge management actions is to build or improve the intranet (Tocan 2012, p. 80).

In case two, the organization has an intranet which is open for every employee. A part or all of the documents are in a website but some may be outdated. Know-how of employees has not been identified and there is no documented tacit knowledge. This kind of organization should focus on digital management of the documents. The documents should have owners who share the reading and editing rights of documents. Also the updating of knowledge should be defined: who updates what knowledge. It is important that a version history of documents is saved so that it is possible to view it later. There

should also be some communication possibilities for personnel. Different options for that are e.g. instant messengers, wikis or blogs. This kind of an organization should also plan how to identify know-how. Identifying is possible by utilizing digital tools. There are many options for tools in the market but e.g. for small company it can be only Microsoft Excel or similar programs. But whatever the tool is it is important that concerned people have the rights to the system so the result can be utilized in management of knowledge development. (Virtainlahti 2009, pp. 141-142.)

In case three, the organization has an intranet which every employee can utilize. The Identifying of knowledge has been done and profiles have been created so it is possible to get information about the knowledge of every employee. The organization has centralized the document management and it has internal tools for communication. But tacit knowledge is not documented. This kind of an organization should focus on documentation of tacit knowledge so that it can be shared and utilized. Also building an experts' database would help with utilizing and managing of knowledge and know-how. The expert's database integrates experts, know-how and contact information together whereby the management of know-how is possible. In addition it is important to have access to experienced knowledge and describing of it. That way it is possible to get to know how work is done in practice. The documenting can be done in different system, like in a wiki, in which updating and sharing are again in an important role. (Virtainlahti 2009, pp. 143-144.)

The case four is a scenario which introduces Second Life based knowledge management environment. This last level organization utilizes know-how and tacit knowledge actively and it uses a Second Life based learning environment internally. A virtual environment which is like the company is in the real life with its buildings, departments and people has been created. The know-how and tacit knowledge is saved in people, actions and devices in the virtual environment. It is possible to search e.g. from different departments by moving and choosing the saved data for watching. People can be found behind the saved data that are responsible for doing and updating the material. The tacit knowledge is saved in the environment either in written guidelines, videos, pictures or combination from these. Any member of the organization can visit virtual environment but it is also possible to block specific documents with the rights if it is needed. Learning can happen by doing it yourself or with a master who guides the person. (Virtainlahti 2009, pp. 144-145.)

3.6   Tacit knowledge management in global company

The management of a company has an essential role when there are major projects and new practices are implemented. This is true also in the tacit knowledge management and especially when talking about a global company where performance is more scattered. The commitment of the management has to be clear for every employee: often there are

open negotiations (e.g. regarding trainings) with management but after the decision making the management is again invisible for the employees. There are many small ways to bring the commitment of the management visible for the personnel. E.g. a representative of the management can open important training events or an interview in the intranet can bring awareness for the management's opinions. The example and encouragement of the management have a significant role in the motivation of employees. (Virtainlahti 2009, p. 205.)

3.6.1 Organizational solutions

When seeking optimal conditions for the management of tacit knowledge it is needed to study the organization's structure and culture. The structure is often built for the organization's functions. Jobs have been divided in accordance with contents and know-how areas of units. The organizations, which are located in a geographically wide area, set barriers for the utilization and sharing of knowledge. Knowledge sharing is often challenging already between departments not to mention offices located in different cities or even in different continents. Although digital communication tools ensure the sharing and utilization of knowledge, even between offices located different continents. But the use of them set new requirements for the management of tacit knowledge. (Virtainlahti 2009, pp. 206-207.)

Nowadays many jobs are done in projects. A project group is gathered for the project and it has a common goal. A project has always a start and an end. Project-based organizations set challenges for knowledge management. Often the project group has been gathered so that the project is for most of the members their first project of that kind. Transmission between different project groups is also challenging. There are often more projects which do the same kind of work at the same organization – especially at the big, global organizations, but there is no any knowledge sharing between these groups. Performance is ineffective from the whole organizations point of view if new project groups do always the same mistakes and use always time to get the same basic information even though the knowledge is already in the organization. The project organizations have a huge challenge in creating circumstances in which it is easy to save knowledge and share it between different projects. However the projects create also possibilities for knowledge sharing when persons come from different units with different know-how and knowledge. (Virtainlahti 2009, pp. 207-208.) When global companies have a lot of projects going on at same time, the role of knowledge sharing is to be amplified. The members of the project can be located in different countries and the communication can happen only using email, phone, video conference and other supporting technologies.

Organization culture is a system of a specific group of people who have embraced it together. It can be said that organization culture is the personality of an organization and there are many things that impact to it, like the industry, size, age, ownership, structure,

city and customers. The culture occurs in different habits and norms in the organization which are reorganized as an approved action. The organization culture is different in a different organization and industry but also inside the same organization. It is possible to feel the difference between offices in different cities and also between different buildings in the same campus. (Virtainlahti 2009, pp. 208-209.) And when talking about global companies, the organization culture differences between units can be very remarkable.

Organization culture has a significant role in knowledge management because it creates the basis for it. The culture can create huge barriers e.g. for the sharing of tacit knowledge but it can also be an effective promoter for it. The culture creates also the used language in the organization. The language is possible to hear and see as a mother language but also as a professional language. Like the organization culture the professional language can change from the organization to another and also inside one organization. There can be language barriers between the departments when e.g. the understanding of guides written by a different department can be difficult to understand. Also different aged employees use language differently which can prevent communication. Difficulties in communication can complicate the enabling of tacit knowledge management. Documenting and sharing of knowledge becomes complicated if the employees have not the same mother language or other common language. There can also be problems in the identifying and appreciating of know-how if an employee cannot show his own know-how because of the language barriers. E.g. expatriates can feel less competent at first if they cannot tell things in a foreign language the same way than in their mother language. (Virtainlahti 2009, p. 210.)

The language is a so important tool of communication that there should be given special attention for it when prerequisites for tacit knowledge management are created. There is a possibility to help by using e.g. dictionaries for understanding a professional language between different departments, units or countries and it is also a good way to help new employees. In a global company it is possible to create understanding and appreciation between different language spoking employees by establishing multicultural groups which focus on language questions and try to find some helping solutions for them. Poor language skills do not mean poor know-how. There should be possibilities to show own expertise so that the utilization of know-how and knowledge does not stop because of it. (Virtainlahti 2009, p. 211.)

The implementation of tacit knowledge management needs time in every organization. Time is set aside for projects but often the most important will be overlooked: employees need time for bringing out tacit knowledge, developing it, sharing and for utilization also. The tasks related to tacit knowledge management are part of the employee's job description – not an additional job which makes the employee work extra. Resource planning is one of the key elements in a superior's work, especially when wanting suc-

cessful experiences from sharing and documenting of tacit knowledge. Proactive human resource structure planning enables the maintenance of know-how and knowledge and thus the quality of performance stays in spite of human resource changes. (Virtainlahti 2009, pp. 177-180.) In a global company the resource planning has to be made even more specifically and as a goal must be the quality of whole organizational performance. The whole company has to have common guidelines for how the resource management is executed.

Wages and rewarding are part of the resource planning also. Rewarding is one of the main functions of human resource management. The rewarding related to the know-how and tacit knowledge is not yet standardized. Some organizations have connected the know-how to rewarding system, e.g. multitalented and degree holders are rewarded financially and also mentors are paid extra for the knowledge sharing. The financial rewarding motivates to seek and achieve goals but in the tacit knowledge management especially non-financial rewarding is amplified. E.g. if the situation is inspirational and teaching is meaningful, it can be satisfactory motivator. Often the long career professionals are interested in sharing their own knowledge forward as long as the situation is pleasant and there is enough time. Giving the master a special position in the end of his career is message also to him that his long experience and know-how is appreciated. Non-financial rewarding is highlighted in a superior's work. The superior can significantly affect the ways how the tacit knowledge is brought out and how the rewarding is arranged. (Virtainlahti 2009, pp. 181-182.)

One part of management is the measurement of actions' effectiveness. This is difficult in tacit knowledge management because of the nature of tacit knowledge. Assessment and measurement of tacit knowledge is more qualitative than numerical. The most important point is that an organization has specific goals which can be measured during the performance. Meters give description about the situation and tell in which direction development is going. A selection of meters effects on what things are under attention and what actions are made. The monitoring gives an opportunity to verify the improvement in productivity which happens through tacit knowledge management. In the best situation the effects are shown in improved business profitability. (Virtainlahti 2009, p. 189, 200.) The development of meaningful metrics for measuring the value, quality and quantity of knowledge is a key factor for the long-term success and the development of a knowledge management system (Alavi & Leidner 1999, p. 22).

3.6.2 SECI model in global context

When talking about the creation process of tacit knowledge in a global company one has to take into consideration many more things than when acting only in a domestic one. Culture differences play a significant role when units located in other countries need to co-operate together. Nonaka and Takeuchi (1995, pp. 197-223) have studied how the organizational knowledge-creation process works in global companies. Nonaka and

Takeuchi's case studies highlight the much more vital importance of socialization for global knowledge creation than it is for domestic knowledge creation. This is especially if production is involved. But a fact that needs to be understood is that organizational knowledge creation across national boundaries is a time-consuming and costly process. (Nonaka & Takeuchi 1995, pp. 197-223.)

One way for global socialization is to send an employee to another country to gain tacit knowledge about a foreign market (Nonaka & Takeuchi 1995, p. 209). The host country usually has some important tacit knowledge which is not available in the home country. Nonaka & Takeuchi (1995, p. 209) highlight the importance of mobilizing employees who have already socialized themselves in a foreign market and culture and also training specialists who are adept at socializing tacit knowledge and externalizing it into explicit language.

One possible case in a global company is that a global product is to be developed and engineers come from two different countries. At the beginning of project there are possibly two different value systems, patterns of engineering or business logic, and approaches to organizational knowledge creation colliding with each other. However the socialization can turn such possibly destructive clashes into valuable chances for innovation. (Nonaka & Takeuchi 1995, pp. 200-212.)

After the socialization the knowledge is externalized. It can be e.g. the adopting of a new approach to product development. If it has been noticed that another unit in the other country has a more efficient or other way better, product development, it can be tried to be adopted for own use also. However it is not very easy to do and a lot of observation, knowledge, understanding and also help from foreigners are needed. (Nonaka & Takeuchi 1995, pp. 212-223.)

For any organizational knowledge creation on a global scale to reach success, three following conditions must be met. First, top management of organizations should show strong commitment to the project. This visible support ensures that also project members commit themselves to the project. Second, it is critical to assign capable middle managers to the project as "global knowledge engineers". Third, there should be a sufficient level of trust among the participants of the project. This requires the use of mutually understandable, explicit knowledge and socialization or face-to-face dialogue that provides a possibility to talk about points of doubt and which leads to willingness to respect the other party's sincerity. (Nonaka & Takeuchi 1995, pp. 212-223.)

3.6.3 Methods for sharing and developing tacit knowledge and supporting technology in the global context

Traditionally, knowledge creation and sharing has occurred through various methods such as face-to-face interactions, mentoring, job rotation, and staff trainings. However

for a global company these traditional methods are too slow and ineffective and there is a need for more efficient electronic methods. (Alavi & Leidner 1999, p. 7.) Tacit knowledge management in a global company is more complicated when the company is bigger, the distance longer and there is less interaction and direct communication. In chapter '3.4.3 Methods for sharing and developing tacit knowledge' the introduced methods are not all suited for global performance or at least some applying has to be used for the methods. The supporting technology is in an essential role because in a global company direct interaction is not always possible. Alavi & Leidner (2001, p. 122) also tell that procedures that are culture-bound can be embedded into IT so that the system becomes part of the organizational norms. This supports a global company so that the routines become the same all around the world.

A global organization should emphasis on e-collaboration which is referred to as collaboration through internet and online systems among a group of associated parties. This should assist the sharing of resources especially across the world in order to improve an organization's success. (Gharavi et al. 2004; Lee-Kelley et al. 2004; Routkowski et al. 2002.) From a technical view it can require web-based technologies and group decision support systems to electronically link associated parties so that they can exchange the information and knowledge to achieve a desired outcome (Fliedner 2003, pp. 14-21). However one has to remember that the transfer of tacit knowledge is very difficult by using technology only and there should always be also direct communication to ensure correct understanding. One way to solve this problem is to visualize. Pictures, diagrams or models can describe clearly complicated matters, when in the same time writing about them and understanding them would be much more difficult. (Ståhle & Grönroos 1999, pp. 90-91.)

Methods have to be changed for them to suitable for the supporting technology (introduced in chapter 3.5 Supporting technology). The teams that support global functions can be virtual teams. Mentoring and orientating can be executed at least partly via supporting technology by e.g. instant messenger, wikis, blogs and expert's database. Ståhle & Grönroos (1999, p. 10) emphasize that the global network creates immeasurable possibilities. A company just has to learn to operate in a networked environment so that it can utilize it. (Ståhle & Grönroos 1999, p. 102.) The communication in global networks needs to happen by utilizing supporting technology so that the every member of a network has access to shared knowledge and that communication is at all possible. Documentation is in a very important role in knowledge sharing in a global context and there are many possible ways to execute it. But the most important fact is that knowledge is available for persons who need it and it is in an understandable format. Nowadays it is common to train by utilizing technology and it is a good way to ensure that all employees get the same training even without being physically in the same place. It is possible to execute meetings using videos and it is also easy and cost-effective. On the other hand, direct interactions are missing and there is more room for misunderstanding.

In a global context there are fewer possibilities for informal meetings than when working physically in the same place. This is a clear disadvantage and a challenge for a global company. However, social media tools can be a solution for this if only employees use them right. Virtual worlds, such as Facebook, enable new ways to support the knowledge and knowing processes because these tools consider the social aspects that are required for knowledge creating and knowledge sharing process (Mueller et al. 2011). With appropriate IT tools, employees can do the same in a professional environment by creating reports of their success in job tasks and adding in the reports images, sounds and videos and also make it available for needed parties (Fidalgo & Borges Gouveia 2012, p. 13).

Integrated and integrative technology architectures are key elements in the development of a knowledge management system because no single dominant technology tool or product can save global organization. The knowledge management needs a variety of technological tools in three areas: database and database management, communication and messaging, and browsing and retrieval. (Alavi & Leidner 1999, p. 22.) The choice of tools depends on the amount of knowledge required, how fast the knowledge is required, effectiveness of communication required and efficiency of communication required (Bajwa et al. 2003).

4   EMPIRICAL RESEARCH

4.1   Case company

The case company is a manufacturer of power and automation technologies. As a manufacturing company it has also focused more and more in services. The company operates in approximately 100 countries. Its business comprises of five divisions that are organized in relation to customers and industries. This study focuses on one of these divisions and more precisely its unit.

The case organization consists of a global technical support, local technical supports and remote monitoring. Figure 4.1 demonstrates the case organization but it shows only a limited number of local technical supports because actually there should be 50 of them (this is an approximation because there are very different kind of leveled technical supports in the local countries so it depends from the method of calculation) but only 15 of these local technical supports participated in the study.
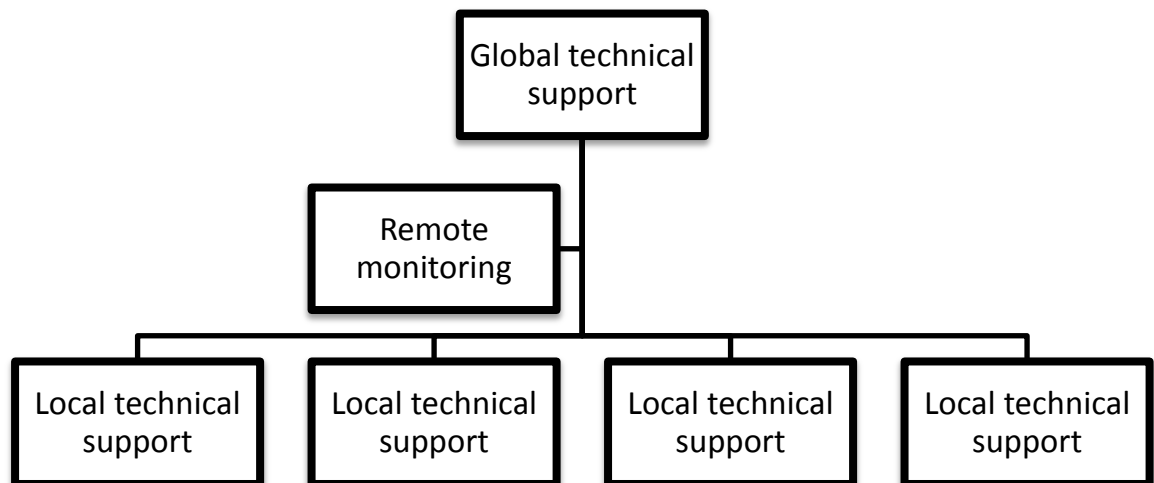
Figure 4.1. *The case organization and its sub-units.*

The study reviews a global technical support which services mainly local technical supports (which service the customer in the specific country) and HUBs (which service the local countries in the specific geographical area) but sometimes also other parties, such as machine builders and end customers. The global support is located near the factory which manufactures products so it has best knowledge about the products and their manufacturing and development. The purpose is to help the local technical supports if

they do not have the knowledge to help an end customer. The global technical support has been divided in five different parts according to different product types but they have a common email system for operating. The global technical support operates from Finland and the local technical supports can be located in any country. A team in the local technical support can consist of different people: technical support engineers, service coordinators, service engineers or someone else. There can be only technical support engineers in the team or some kind of a mix from the aforementioned parties before. Also the level of local technical support can differ a lot among the countries. Some of them have just started with a technical support process and whereas some can have very much know-how and knowledge about the technical support and do not very often need the global technical support's help. The communication between the global and local technical supports happens by using emails and phones.

Knowledge has a significant role in the technical support. It can be knowledge about e.g. a product, customer or fault. Tacit knowledge management is not the core competence of a traditional manufacturing company and it might be difficult for one to see its importance also. In the case company knowledge management has been developed mostly in form of stored documents, guides and manuals but there is not any development for tacit knowledge management, at least not any controlled or designed development in a bigger context. However there is so much tacit knowledge in the technical support both in the global and local level that the company would benefit if it would be possible to get it to the whole organization's use. The need for the development of tacit knowledge management arose when the global technical support began with a project for the acquisition of a new IT tool. The idea was to get a new, modern tool in place of the old and cumbersome email system and the need was that the tool would support the operating in the global support better. The goal is that the tool would support knowledge management in a new way by eliminating dual working and utilizing the existing knowledge. Another objective is to get a more streamlined process for the service requests handling. This was an opportune for the company to study also how tacit knowledge could be developed.

At the same time there was going on a developing project for a new service, remote monitoring, in the case company. Remote monitoring means monitoring of a product remotely through a system. If the monitoring recognizes a fault in the product, the response is fast with the help of the data got from the system and with knowledge from manuals and old cases. The service is not yet implemented but the idea is that the local countries (and their services) operate this service and if they have some technical questions they may ask help from the global technical support (if the local technical support cannot help). This remote monitoring process needs a lot of knowledge for analyzing the gathered data and it was noticed that the knowledge is the same as the technical support has and needs. Thus it was realized that these services should co-operate with the

developing of knowledge management and therefore the remote monitoring is also a part of this study.

4.2   Data gathering

The empirical material of this study was gathered through focused (i.e. semi-structured) interviews and using the Delphi method. The case company's different documents, process charts and manuals were also utilized. The next subchapters introduce more specifically the used gathering methods and explain how the research was conducted.

4.2.1   Focused interview

An interview has many things in common with a conversation. There is both verbal and nonverbal communication in both cases and both deliver thoughts, attitudes, opinions, information and feelings. The affecting of participants happens in face-to-face communication. If the conversation and interview are good enough they give satisfaction to the participants. The goal of the interview is to gather information and an interviewer leads the conversation towards it. (Hirsjärvi & Hurme 1988, p. 25.)

A focused interview can be categorized as a study interview. The goal of the study interview is to acquire reliable information systematically from the study problem. The study interview is pre-planned and the interviewer has experience from the subject both in practice and theory. The interviewer builds up and directs the interview and also the motivating of the interviewee is in his responsibility. The information of the study has to be verified and summarized by using scientific methods if it is used for solving a problem. (Hirsjärvi & Hurme 1988, pp. 25-27.)

The focused interview is a typical method of a quality research. The focused interview is as a method between an open and a structured interview. It is typical for both the structured and focused interviews that there are ready-made questions which the interview follows. (Eskola & Vastamäki 2001, pp. 24-27; Koskinen et al. 2005, pp. 104-105.) The questions are the same for every interviewee and answering happens by using own words (Eskola & Suoranta 1998, p. 95). The main difference between structured and focused interviews is that in a focused interview the interviewer has the right to differ from the questions and ask extra questions. The focused interview differs from an open interview with the questions because in the open interview the interviewer tries to affect to the progress of interview as little as possible and rather just discuss with the interviewee generally from the topic. (Eskola & Vastamäki 2001, pp. 24-27; Koskinen et al. 2005, pp. 104-105.)

There are four characteristics in the focused interview which should to be taken consideration when doing the interview. These are extent, reactions of the interviewees, depth and a personal context. The extent means that the interviewer should give to the inter-

viewees the possibility to highlight the viewpoints they want. The reactions of inter-viewees should be documented as strictly as possible. The depth means that the inter-view should give a comprehensive picture from the situation for the interviewer. The personal context should be noticed because it effects on to the result. (Hirsjärvi & Hur-me, 1988, p. 36) Criticism towards the focused interview has been presented because it gives only a contextual related description from the reality (Miller & Glassner 1997, pp. 99-101). On the other hand the interview gives to the interviewee the possibility to tell his own opinions and about his own experiences (Eskola & Vastamäki 2001, pp. 25-26) and thus it is possible to understand long-term experiences of the person (Peräkylä 2005, p. 869).

The interviews can be either individual or group interviews. Group interviews can be more productive than an individual interview. (Eskola & Suoranta 1998, p. 95.) If the communication and co-operation is fluent between the group members, the result can be very fruitful. But if some member of the group has powerful opinions, he can have an effect on others' answers (Hirsjärvi & Hurme 2001) and some shier member cannot necessarily express his opinion. Preece et al. (2002) explain that the individual interview can happen face-to-face or by using phone if a physical meeting is not possible. Body language is missing in a phone interview but despite of that there is much in common with a face-to-face interview. E.g. the interviewer and interviewee are in a language interaction and both have the possibility to give comments and ask questions if needed. (Preece et al. 2002.)

The execution of a focused interview has three parts: planning, interviewing and analyz-ing of the interview material. The goal for the interview is to get results which corre-spond with reality. There are many reasons that can effect on the reliability of a focused interview: validity of concepts, a poor content, a failure in interviewee selection, low levelness in exactitude of information transfer or a failure in the definition of attributes. (Hirsjärvi & Hurme 1988, pp. 129-130.)

4.2.2 Conducting focused interviews

The focused interview has been chosen for this study because it makes it possible to focus on the chosen themes, i.e. the information needs and the development of tacit knowledge management. The themes are not well known at the case company and the interviewees have not been dealing with them earlier so e.g. the structured interview would not have been a good choice because of its inflexibility. Otherwise there might have been some missing points. The focused interview gives possibility to extra ques-tions and leaves more room for explanations and conversation. It also makes possible to confirm that the all participants are speaking truly about the same issues in the same concepts. The focused interview suits this study very well because as many as possible ideas were wanted from the interviewees.

The global environment of the case made the execution of the interviews more challenging. The locations of interviewees and participants can be seen in Figure 4.2 and also in Tables 4.1 and 4.2. Because of the global nature of the case the interviews were executed by utilizing different kinds of tools: one was executed by using a video meeting, three by using phone calls and one by using a face-to-face meeting. Both group and individual interviews were used. One interview was executed by utilizing a group interview and the rest were individual interviews. The group interview was chosen because there were many people doing the same job but with a different product and it was needed to know all of their opinions from the subject. The group interview made it possible to get information from them all and it created also fruitful conversations between the interviewees. The individual interviews were chosen because the interviewees, who did the same job, were located in the different countries.

The interview questions (see Appendix 1) and objectives were sent to all interviewees at least two weeks before the interview so that they had time to get to know the subject and questions. The interviews were executed during three months from January to March, 2013. All the interviews were recorded so that the interviewer could focus on the interview fully and it made the analysis process easier.

The interview of the global support was executed as a face-to-face group interview in facility of the case company. One member from each product group of the global support was invited so that the result of the interview would be as comprehensive as possible. The process owner of the global technical support and the superiors of supports helped in the invitation process and suggested interviewees. The selection of interviewees was done by choosing an employee who knew the support process well and most likely had some ideas for the interview themes also. So the interviewees were professionals of technical support and no-one had professionalism from the interview themes. But they had a lot of knowledge from needs of the support process. Four of the five product group members were represented in the interview. The missing of one product group did not have a huge impact because its process was represented in other participants' opinions and actually that product group uses the global support the least and probably would had had the least to give to the interview. There was one interviewer and the interview took 56 minutes. The used language was Finnish because all the participants were Finnish.

One individual interview was executed through a video meeting, one in a face-to-face meeting and the other three by phone. The process owner of the global technical support helped in also this invitation process and suggested interviewees. The selection of interviewees from local technical supports was done by choosing an employee who had been an active user of global technical support and by choosing local supports in which the development of the support processes was in a different level. The goal was to find supports which had just started with the support process and on the other hand supports

which had developed the process further. In the couple of cases the local superiors helped to reach the most suitable people for the interview. The interviewees from local technical supports were either technical support engineers or service coordinators and most of them had a past in the field service engineering which helped them to under-stand the needs from that point of view too. The purpose was to get the interviewees of local technical supports from different parts of the world but it turned out to be difficult because of the time schedule, availability problems and willingness to take part to the interview. Last two difficulties may relate to the people's willingness to use another language and especially when they need to speak about unfamiliar themes. The choice for the interviewee of the remote monitoring process was natural because the manager, who was responsibility for the developing of the process, knew best the process. Used language was therefore English, except the interview of remote monitoring was in Finn-ish. There was only one interviewer in every case and the interviews took from 31 to 50 minutes. There is more detailed information of the individual interviewees in Table 4.1.

Table 4.1. *Summary of the interviewees and their backgrounds.*

Function	Reference	Title	Location	Type of Interview	Type of meeting
Global technical support	Group A	Technical support engineer (product group A)	Finland	Group	Face-to-face
	Group A	Technical support engineer (product group B)	Finland	Group	Face-to-face
	Group A	Technical support engineer (product group C)	Finland	Group	Face-to-face
	Group A	Technical support engineer (product group D)	Finland	Group	Face-to-face
Local technical support	Interviewee B	Technical support engineer	United Kindom	Individual	Phone call
	Interviewee C	Service coordinator	Denmark	Individual	Video meeting
	Interviewee D	Field service engineer and technical support engineer	Morocco	Individual	Phone call
	Interviewee E	Service coordinator	Brazil	Individual	Phone call
Remote monitoring	Interviewee F	Product manager	Finland	Individual	Face-to-face

4.2.3   Delphi method

The Delphi method is an iterative process to collect judgments of experts. Data collection happens in series and analysis techniques are interspersed with feedback. The Delphi method suits best for a situation where the goal is to improve the understanding of a problem, opportunities and solutions or to develop forecasts. The typical Delphi process starts by developing the research question and designing the research. After that the selection of research participants and development of round one questionnaire are exe-

cuted and distributed to the participants who complete and return them back to the researcher. The researcher analyzes the answers and summaries them. After this starts the second round of the method when the round two questions are developed based on the summary. The round two questions are sent to the participants who complete and return them again. This iteration is executed as many times as it is necessary and then the researcher verifies, generalizes and documents the research results. The Delphi method can include also a pilot study if needed. The typical Delphi process is a general guide rather than a template which can be modified so that it answers best to the research questions. (Skulmoski et al. 2007, pp. 1-5.)

The Delphi method is a flexible research technique which suits well for situations where knowledge is incomplete about phenomena. It is not just a quantitative method because it works well also in a qualitative research. There is a lot of variation among the Delphi methods. It can be qualitative, quantitative or mixed from these two. But common to all Delphi methods is that there are design considerations which include a sample composition, sample size, methodological orientation (qualitative or/and qualitative), number of rounds and mode of interaction. Considering these choices helps to add rigor to the method and makes the success of the method more likely. (Skulmoski et al. 2007, p. 12.)

Delphi method was used in the study so that it could be possible to gather more information from all around the world. The acquisition of information would not have been possible through interviews because they take so much time. However there was a need for a confirmation that the results of the interviews were true also in the other countries and there was also a need for comments to the result of interviews from the other countries. The Delphi method was executed through email. However there was no time for many rounds so the method was applied so that the first round answers were the results of the interviews and the rounds ended after the answers to this summary. The Delphi method suits very well for this study because it is so flexible that it makes it possible to apply it according to the study.

The Delphi method was executed during April, 2013 by using email. The sent email can be seen from Appendix 2. The email was sent to 50 service managers all around the world and it was asked for the receiver to either answer it himself or forward it to a suitable person. Most of the respondent were however service managers. All the participants of Delphi method can be seen in Table 4.2.

Table 4.2. *Summary of the participants in Delphi method and their backgrounds.*

Function	Reference	Title	Location	Type of Interview	Type of meeting
Local technical support	Respondent A	Service Manager	Austria	Delphi method	Email
	Respondent B	Engineering and Service Manager	Uruguay	Delphi method	Email
	Respondent C	Managing director	United States	Delphi method	Email
	Respondent D	Service Manager	Mexico	Delphi method	Email
	Respondent E	Product Manager	Finland	Delphi method	Email
	Respondent F	Service Manager	Croatia	Delphi method	Email
	Respondent G	Manager	Portugal	Delphi method	Email
	Respondent H	Service Manager	Jordan	Delphi method	Email
	Respondent I	Service Manager	Spain	Delphi method	Email
	Respondent J	Service Manager	Slovakia	Delphi method	Email
	Respondent K	Service Manager	Netherlands	Delphi method	Email

11 responses were received back which means that only 22 % recipient countries replied to the email. The participants got a two weeks response time and they were sent two reminding messages. Likely reasons for the low reply level are the language (used language was English), unfamiliar themes of study and used channel (people get so much emails nowadays). The goal of the study was to get responses evenly from all countries around the world but as it can be seen from Figure 4.2 e.g. there is no response from Asian countries and this can be seen as a weakness of this study. However, the received responses had very much in common even when they were from different parts of the world which may mean that the responses of Asian countries could have been similar also. Also the results of Delphi method supported very well the results of the interviews.
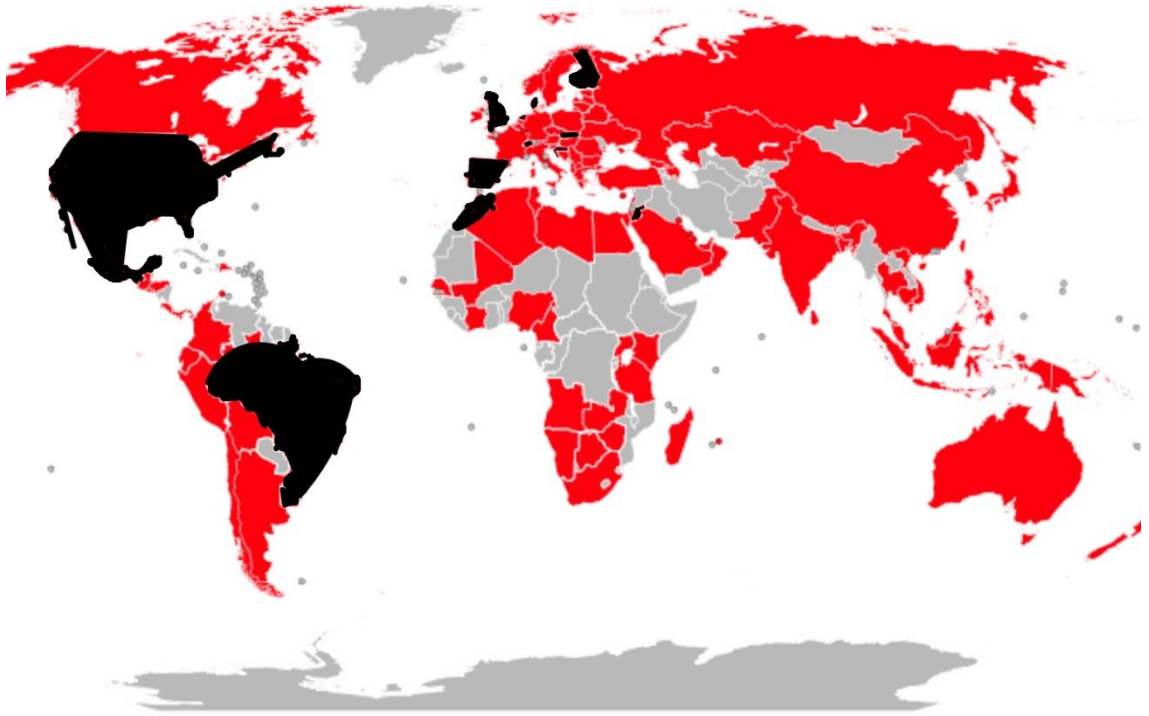
Figure 4.2. *The locations of the interviewees and also the participants in the Delphi method (the case company operates at the red colored countries and the participated countries are in black).*

4.3   Data analysis

The analysis was executed by utilizing the next two frameworks. The method which gives frames for the whole analysis process is introduced in Figure 4.3.
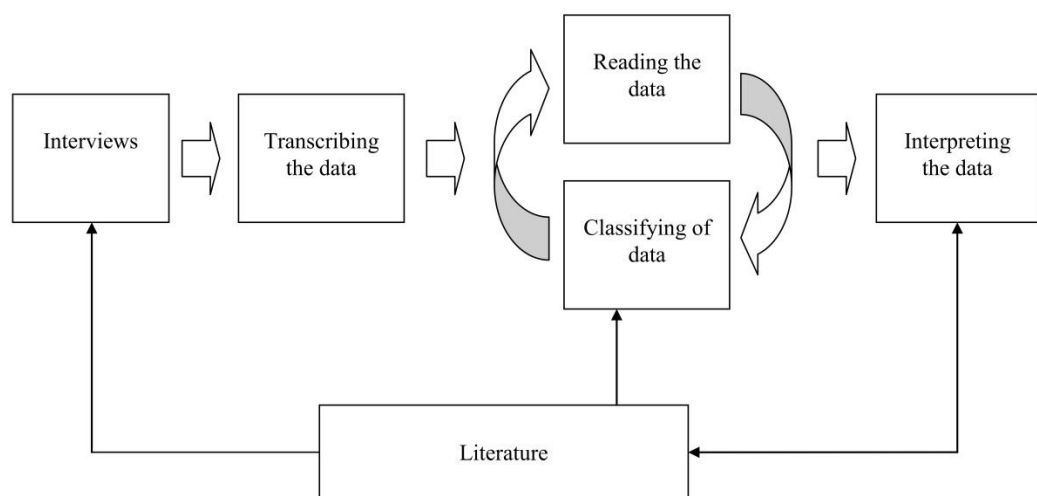
Figure 4.3. *The summary of the analysis process (adapted from Kukko 2013, p. 23).*

Tuomi & Sarajärvi's (2009, pp. 91-92) model gives more detailed guides for Kukko's (2012, p. 23) phases of model (for phases 'reading the data' and classifying of data):

1. Decide which are the most interesting issues in the material.
2. Read the material and mark the interesting information.
3. Eliminate everything useless from the research.
4. Separate the marked material from the other material.
5. Classify and organize the material into themes.
6. Write a summary.

The interviews of this study were designed by utilizing the same literature which has been used in this document. The recorded interviews and answers of the Delphi method were transcribed in Word and Excel documents so the reading and classifying were easier. There was a lot of material so it was essential to find the interesting and important information and separate it from the other material. This reading, classifying and organizing into themes was an iterative phase which was repeated many times and also the literature the classifying. After iteration rounds a interpretation was made from the data and a summary from it. The Delphi method was executed by utilizing this summary. This summary was sent to the participants through email and after receiving the answers it began again the iterative phase of reading, classifying and organizing into themes. The development ideas were prioritized based on how many times they were mentioned in the interviews and answers of the Delphi method. The subject has to be mentioned for six to nine times to get in the high priority list, for two to five to get in the medium priority list and for one time to get in the low priority list. After many iteration rounds it was possible to do the interpretation from the data and review the literature against empirical findings. Finally, a summary was written from this..

5 RESULTS

5.1 Technical support process from local level to global level

The processes of the local technical support and global technical support are separated and the case company does not have a comprehensive picture of the whole process from the local level to the global. The interviews made it possible to find out how the process really works from the beginning to the end. The process chart, drawn by the interviews, can be seen from Appendix 3.

The local technical support process can be started by an end customer, partner, service engineer or some other internal person who needs help with some technical problem. The service request originates by phone, email, and instant messenger or face-to-face. After the received service request the support tries to help the customer to diagnose and do the service by himself. If the customer is unable to go any further, the support contacts the coordinator center and asks them to assign a service engineer on the customer's site. There are some differences between the countries how the process proceeds. Some local technical supports assign the service engineers, while some contact the coordinator center to ask them to do it. Some of the countries use an IT system for operating the support, some use just emails.

"A inquiry comes by phone or email. Then we take the information (product, software) from email and put it into the system. If we have enough information and knowledge we will tell the solution to the customer. If we have some missing information we ask the information from the customer and solve the problem." (Interviewee D)

If the local technical support cannot resolve a customer's problem and it needs help with some technical question, it has two options to proceed depending on the location of the country. Some countries are located in an area where a HUB has the responsibility to help and in these cases the local technical support asks help from the HUB. If countries do not have any HUB nearby it takes direct contact to the global support. Actually in some cases the local support may contact the global support directly even when there would be a HUB near. Also, if the local country has experts in their own country, the local support may use their know-how and knowledge instead of asking from the global support.

"There are two ways to escalate the case to the global support: by email system or we can ring directly to the 24/7 support line. Most often it is email and in urgent cases the call." (Interviewee B)

The global technical support is a service for internal use only as default. However the end customer may contact the support directly if he has gotten the contact information somewhere. The case handling is done through an emails system.

"The system guides the operating but there are still differences in working methods between teams." (Group A)

"The end customers contact sometimes but we always guide them to contact the local technical support in their countries. But of course we help them but also assign the case to the right party." (Group A)

If the global technical support cannot solve the problem, it escalates the case to the R&D team and documents the solutions so it is possible to utilize them also later on. Finally the global support tells the solution to the local support and the local support further to the customer. The global technical support team communicates continually with the R&D team about the cases and reports if repeating problems arise. It also informs the sales team if there are any sales leads.

5.2   Development ideas

Global support had noticed that there was a lack of transparency in the support process and that it caused duplication and ineffectiveness. Every team in the local level and the global level can have good transparency inside a team but especially the global transparency between teams was missing. Every country has its own IT systems and the systems have not been integrated. Some countries may not have a system at all for the service case handling. The encouraging of sharing information and knowledge is missing and there is not a place where to share the information and knowledge.

Almost all participants said that a common process is missing and the existing tool does not support the process. The need is to get a more advanced tool which has more functions than the email system can offer. The better tool would also support that a common process could be developed process and the tool would guide it to work correctly.

"A global standardised approach to technical requests could be useful. This would enable comparing of results. " (Respondent K)

"The tool is not good, it does not support the process. The searching of the old cases is difficult because the search function is so poor. The information searching from old

emails is time consuming. The old cases would be very useful in a new case resolving. Earlier answers should be more easily available both the inside team and also the customer could see how the problems have resolved before." (Group A)

"The most important issue from my point of view is to have a case tool where you can find the previous cases (with a search engine) so that we can re-use previous experiences. And we also would know if similar problems have appeared in the other countries." (Respondent B)

"Where are the online self-help tools for our customers? We force our customers to call us while our competitor is servicing them online and providing self-help tools." (Respondent C)

"We need a system that would connect all parties of the process so that there would not be missing information from cases like we have this problem today." (Interviewee E)

The availability of information is in an essential role when resolving the support cases. The missing information wastes time and the customer has to wait longer. The process should be developed so that there would be missing information as rarely as possible. The visibility of information would be two-way both from the local to the global and the other way round. The global support needs information about the case so that it can solve the problem and on the other hand the local support needs to know the root cause of the problem so it can help the customer.

"The problem is that the global technical support often does not know a customer's location but only the country. So there should be mandatory fields in the case form." (Group A)

"It should be possible to put the needed information to the mail before sending the service request to the global support so the process would be faster (no more receiving emails back because of missing information.)" (Interviewee C)

"Because of the nature of the email system there is often missing information. When sending long email chains it is too probable that some messages of important persons have dropped. " (Respondent D)

The support is typically a process which includes a lot of knowledge but a common process for the sharing and utilization of it is missing. Controlled knowledge sharing would help every participant's work and one would not have to invent the solutions for the same kinds of cases over and over again. However, the sharing should be controlled so that sensitive material would not get in to the wrong hands.

"The main need of local technical support is the knowledge. There is a huge amount of products combined with the applications so a lot of knowledge is needed to help customers with their technical questions." (Respondent I)

"The most important area of development is the knowledge sharing globally."
(Interviewee B)

"One should be very careful when building the database for knowledge so that everybody cannot see sensitive material. No material should be published without some person ("controller") seeing it." (Group A)

Communication is in an important role when operating with different parties located in different countries. When operating in the global environment the language affects to the communication. Sometimes the phone is not best tool for the communication because the line can be bad, it can be hard to understand the other one if there is limitations in used language and participants do not have e.g. dictionaries for help. If the communication is inadequate there can be a lot of misunderstandings and the case handling becomes more difficult. Every participant should know their responsibilities and there should be a clear vision how the case is handled and how urgent the case is.

"It should be possible to tell the criticality of service by classifying the case based on the urgency."(Interviewee C)

Working in the technical support can be hectic when there are many service requests waiting for solutions and still for all of them the service should be fast and quality the best. For ensuring this the employees should have a possibility to train themselves. However there is not often time for that.

"The support has to be focused on answering to a customer's need. This is the main reason and the quality and speed of the answer is a must in this chain." (Interviewee I)

"The process could possibly be improved by having breaks to learn more about the technical information away from the phone." (Interviewee B)

Most of the interviewed local supports and the global support do not have a continuous or a systematic customer feedback gathering. The gathering is occasional and mostly happens by the initiative of the customer. There is also no global metrics and in most of the cases no local either. Without systematic metrics and reporting the development is more difficult.

"There is a possibility to gather customer feedback but it has not been done lately. Direct feedback is listened but it is not gathered anywhere. There is need for this but no-one has time. It should be an automatic system." (Group A)

The technical support is not doing the development of products but it can have a great impact to it because it is in a potential place to hear or see which products should be developed and how. The employees of support can have ideas and also they can hear ideas from the customers. These opportunities are utilized too seldom.

"Meetings and experts days with the R&D team are strongly needed." (Interviewee E)

"The service organization would be nearer in a practical sense to the end customers. It could listen what end customers have to say about the developing of products and services." (Interviewee E)

The support organization has many issues which need developing and the prioritized ideas can be seen from Figure 5.1. The ideas are divided in three categories: ideas with high, medium and low priority.

High priority
- Common process is missing
- Controlled knowledge sharing
- New tool
- Utilization of old cases
- Availability of information
- Global transparency

Medium priority
- Better visibility for urgent cases
- More time for learning from old and new products
- Communication between different parties
- Global metrics
- More information about root cause of fault

Low priority
- Automatic customer feedback gathering
- Self help tools for customers
- Utilization of experts in R&D
- Listening end customers when developing service products
- Resbonsibilities in case handling
- Reporting

Figure 5.1. The summary of the prioritized development ideas.

5.3   Information needs

The global and local supports have different information needs. They need information from the customer and from each other. Because the local support is the party who is in connection with the customer it is important to know what kind of information needs the global support has so that the local can get the all needed information from customer, and the service can go smoothly. Information is in an essential role in operations of the supports and its getting and transferring has to be easy and fluent. The information, that the global and local supports need to solve a customer's problem, is classified in Table 5.1.

Table 5.1. *Information needs of the global and local technical supports.*

GLOBAL SUPPORT NEEDS	INFORMATION NEED	DESCRIPTION	MANDATORY	LOCAL SUPPORT NEEDS
Yes	Product type	Type name	Yes	Yes
Yes	Serial number	8 or 10 digit number	Yes (possible to solve without if the product type is known)	Yes
Yes	Description of fault	What happened, when, why, what happened before the problem	Yes	Yes
Yes	Fault code	Standard code set by case company	Yes	Yes
Yes	Criticality	Criticality level of the case		Yes
Yes	Application	Revision		Yes
Yes	Customer	Name, phone number, company, address		Yes
Yes	List of parameter	As an attachment		Yes
Yes	Product environment	Description and other products		Yes
Yes	Sales contract	What has been sold, when and for what purpose		Yes
Yes	History of customer's service cases	The failure description, solution, solver and knowledge about customer		Yes
Yes	Measurements	Product, environment		
Yes	Picture	From product and environment		
Yes	Circuit diagram	Only some cases		
Yes	Know-how level of the local service	Know-how, knowledge, possibilities for service, available tools		
	Solution of case	To customer	Yes	Yes

The information needs are dependent on the complexity of the problem. Sometimes only information about the product and fault is needed to solve the technical questions but sometimes much more detailed information about the case is needed.

"The information needs for solving a customer's problem vary case by case."
(Group A)

The acquisition of information is done mostly by asking the customer. Sometimes the customer cannot give the information because he does not know or does not have enough knowledge about the situation or product. But still the customer has to be serviced.

"To ensure that every party gets all needed information there should be some mask in the email form including e.g. serial number, parameters etc. or whatever the global support needs to resolve the case. This could reduce the sending the service request back and forth just because of missing information." (Interviewee C)

"We do not want to push a barrier between us and the customer by saying we cannot help you unless you do not answer all these questions when he is only asking a very simple question. So we cannot set a barrier by asking too many questions."
(Interviewee B)

The global support often needs more detailed information than the local support because it has to solve more complicated service request. Thus the global support has more information needs in Table 5.1 than the local. However there are also many of the same needs and one of them is the history of the customer's service cases. Both parties would have a lot to give and share for this kind knowledge database. But currently it is not possible to utilize the old cases or at least it is not efficient.

5.4 Tacit knowledge management

Tacit knowledge management in is a rudimental level in the case organization. However like it can be seen from the previous chapters there is need for tacit knowledge management. There are many development ideas relating to tacit knowledge (see Figure 5.1). The idea most related to this, 'controlled knowledge sharing', is even in the high priority list. Other ideas in which the development of tacit knowledge management is related closely are 'common process is missing', 'utilization of old cases', 'more time for learning from old and new products', 'more information about root cause of fault', 'self-help tools for customers', 'utilization of experts in R&D' and 'listening end customer when developing service products'.

Two of the information needs ('history of customer's service cases' and 'know-how level of the local service') are related to tacit knowledge management closely. So there is also a need for documented tacit knowledge and information about tacit knowledge. The tacit knowledge has an important role in the technical supports and thus there are development ideas and needs for it.

"There is a lot of useful information and documented tacit knowledge in the support's email system which could be utilized in the resolving of new cases but the material is difficult to find." (Group A)

"It would be good if it was possible to utilize the old cases. Searching could be done by fault codes and products and it would be possible to see how these special type cases have been resolved." (Interviewee F)

There are some tools for knowledge management in the case company but they are not very advanced and there is nothing especially intended for tacit knowledge management. However, there is already some tools in use which are suitable for the sharing of tacit knowledge, e.g. "Hints and tips", but they are not used for it systematically or under guidance. Also the global transparency and the utilization of the whole network are missing.

"If we have solved something by an unique answer and the solution has come from the global support, we will include it in our "Hints and tips" which is a database where we keep uncommonly known answers to questions." (Interviewee B)

There is no comprehensive plan for tacit knowledge management which would guide and support employee's actions. There are only some separate systems which are not integrated and the level of utilization is low. Every local country has its own systems and practices so global utilization is difficult, especially when the sharing of tacit knowledge happens without documenting in IT tools.

"We have four times a year technical meetings where service engineers discuss about cases which have been resolved in a special way. We also discuss if there is any new information from the factory or the global support. But we do not document anything."
(Interviewee C)

There are many previous kinds of meetings in the local supports but there is no knowledge sharing between these meetings. So that sharing would be possible there should be some kind of a common system or database, but then there should be also someone to document the knowledge. The motivation for knowledge documenting has an essential role in tacit knowledge management but it is not easy to get people to document.

"It should be easy to gather the information and easy to put it in the system. Because if it is not, nobody going to do it." (Interviewee C)

"Gathering and transferring the local knowledge to the global knowledge is difficult because the field service guys do not like to write so much. They just want to resolve the problem very fast and after that they do not like to fill papers and reports. They do not speak very good English which complicate the situation. The local technical support could fill the information in some kind of database but they should get information first from the field service engineers." (Interviewee E)

"A good motivator is benefiting from the documenting somehow." (Interviewee D)

Different options for tacit knowledge sharing in the global enviroment have been suggested. If there was some kind of a common database, one should remember to be very careful with the sharing of tacit knowledge so that the classified knowledge does not fall into wrong hands. Different level access rights in the system for different groups are one solution for this.

"I would appreciate to have some kind of internal forum for sharing of problems and solutions among the service engineers. The forum would need some simple administration, just to keep it clean from possible junk. It seems very unusual to me not to use the experience of the huge group of service engineers." (Respondent F)

"The network could help itself: forums for experts who could help each other. The network has lot of knowledge so why would not share and utilize it." (Group A)

"One possibility is forums where participants could discuss things related to the topic and ask questions like 'have you met this kind of problem' etc. It is a pity that there is nothing like this because there certainly are people who would like to discuss like this about products." (Interviewee F)

"The result of a good discussion or resolution can be saved in the knowledge base which can be accessed easily. Again it will need a simple administration just to keep it alive."
(Respondent F)

There is a lot of tacit knowledge in the global and local supports of which sharing would be useful for every party. Also there is same kind of knowledge about product faults in the new service, remote monitoring. So it would be useful for all parties that these different processes would share knowledge. And actually there is already some level of cooperation in reference countries but it is not yet worldwide.

"Andy is in the remote service's reference group at the moment. One of the things they are going through is the product x's faults one by one and they are looking the solutions from manuals. Everyone can add knowledge about a fault to the remote monitoring da-tabase." (Interviewee B)

So manuals for fault solving have been developed and these kinds of manuals would be useful also for the global and local technical supports. User manuals and user experi-ences have been used to create these remote service manuals. At this point the creation has been done by combining different sources.

"The combining is done by searching knowledge from different manual by fault codes. Basically the knowledge is already in the organization but it just has to be found and combined so that it is in understandable form." (Interviewee F)

There are many reasons for share tacit knowledge between different processes inside the same company if they are operating with same kinds of problems. The local organiza-tion feels easily that they are own organization and not utilize the potential of global organization. The global organization has so much knowledge e.g. some product but it cannot utilize all of it yet.

6   DISCUSSION

6.1   Categorizing development ideas of support process-es

As it was mentioned in chapter 5.2, 17 ideas arose from the interviews and the Delphi method. The ideas were categorized based on their priority in Figure 5.1. The categorization was taken forward and categorized also by themes in which they are related to. Three themes arose from the ideas: the case handling, tools and knowledge management. The ideas are categorized by these three themes in Table 6.1.

***Table 6.1.** Categorized development ideas for support processes.*

Priority	Idea	Case handling	Tools	Knowledge management
High	Common process is missing	x	x	x
	Controlled knowledge sharing			x
	New tool		x	
	Utilization of old cases	x	x	x
	Availability of information	x	x	
	Global transparency		x	
Medium	Better visibility for urgent cases	x	x	
	More time for learning from old and new products			x
	Communication between different parties	x	x	
	Global metrics		x	
	More information about root cause of fault			x
Low	Automatic customer feedback gathering		x	
	Self-help tools for customers		x	x
	Utilization of experts in R&D			x
	Listening end customer when developing service products			x
	Responsibilities in case handling	x	x	
	Reporting		x	

As Table 6.1 shows most of the development ideas are related to the tools which supports the global support's decision (like it was told in chapter 4.1) to get a new, more advanced IT tool for its use. There will be some changes also in the case handling process when the new IT tool will be implemented and the goal is to get improvements also in Table 6.1 mentioned areas with the help of the new tool. Knowledge management also has a remarkable role among these development ideas. This means that the organization is on the right way when developing tacit knowledge management because there is clearly a need for it.

6.2 Categorization of information needs during support process

The information needs of the global and local are listed in Table 5.1. The information needs are closely related either to the customer or the product. Both processes have own and common information needs. Figure 6.3 illustrates which needs are common and which own.
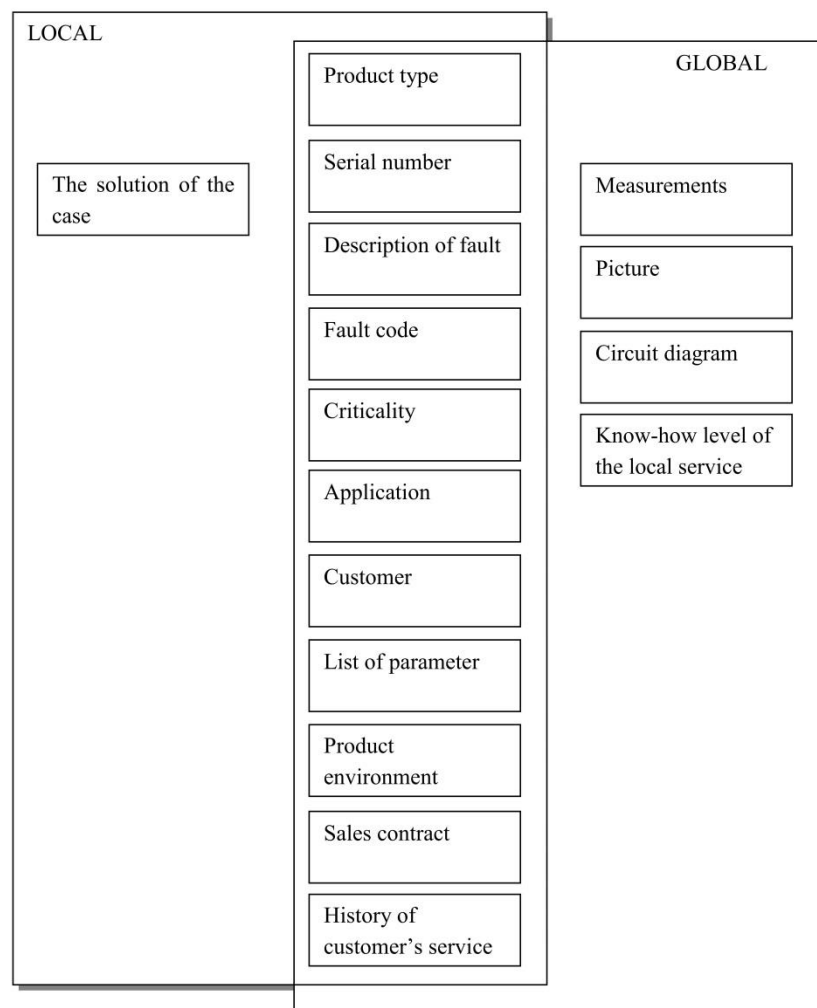

Figure 6.2. *Categorized information needs between the local and global supports.*

Most of the information needs are common which makes the pursuit of information easier between these processes as both have same goals. The local support is the party which acquires most of the information so the common goals contribute that both parties get the needed information. The global support has also own needs that give a bit more detailed picture of the situation so that it has a better possibility to resolve a more complicated problem.

The local and global supports have very similar information needs. Leckie et al. (1996, pp. 183-183) highlights that there many different factors that are affected on the information needs, like the demographic factors, context, density of information need, predictability, importance and level of complexity. Thus there could have been more variety between the local and global support but also between only the local supports because of the different backgrounds and locations. This shows that the processes works quite similarly even when the common process is missing.

The information needs can be divided based on their level of knowledge into three categories: data, information and knowledge. Figure 6.2 shows in what level of knowledge these needs are and in what phase of the overall process they occur.
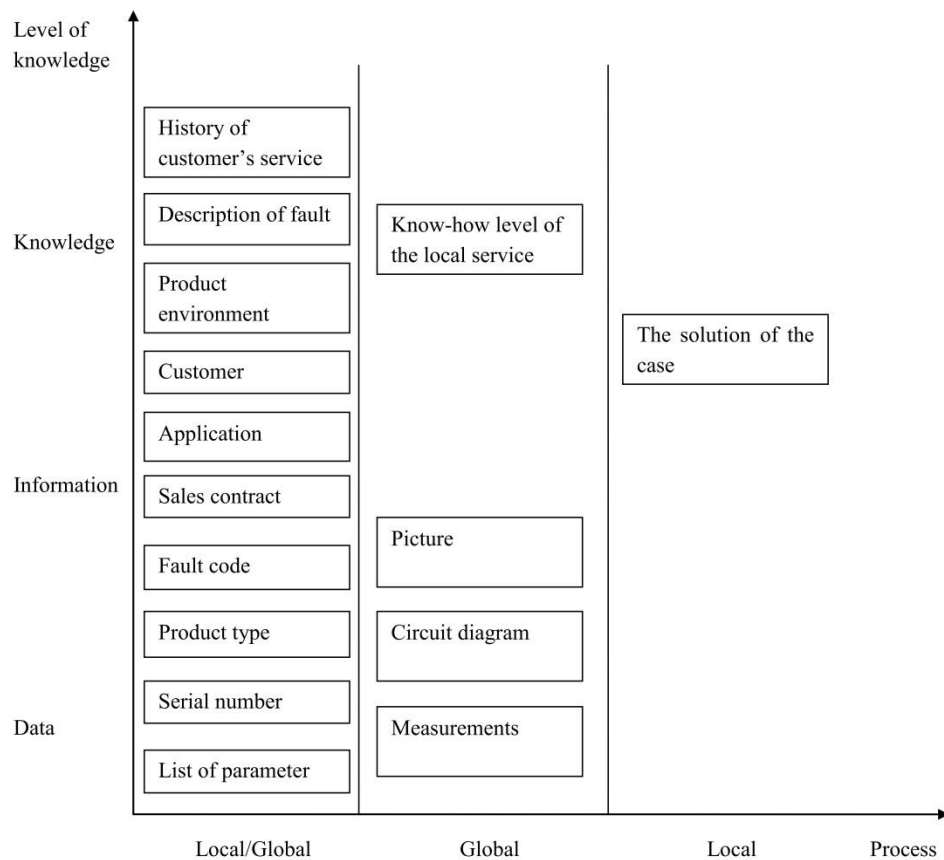

Figure 6.2. *Categorized information needs by the level of knowledge and during the overall process.*

There are information needs from every level of knowledge. There is needed data, like a list of parameters or measurements, information, like a sales contract and knowledge, like description of a fault and the know-how level of the local service. Both the local and global processes need knowledge from all the level of knowledge and like Figures 6.1 and 6.2 show most of the needs are common for both of these processes. Most of the needs occur in the beginning of the overall process and because the local process happens first, it has to acquire them. This is also easier because the local supports are operating with the parties who can give this information.

There are many needs that are related to knowledge and more specifically to tacit knowledge. E.g. for the history of customer's service there should be tacit knowledge from the done service, how everything went, what kind of the customer is, and does he have special needs etc. The description of a fault includes tacit knowledge from the occurrence of the product failure, how the failure happened and why. The know-how level of the local service needs tacit knowledge for mapping and also for the storing of it in a database. The solution of the case includes a lot of experts' tacit knowledge and it has actually a very important role in the solving of cases. When there are many needs relating to tacit knowledge it is necessary also to development tacit knowledge management or otherwise it will be difficult to fulfill the needs. So the both the arisen development ideas (in chapter 6.1) and the information needs indicate that there is a need for the development of tacit knowledge management.

6.3 Ways to fulfill the information needs

It is important to find the ways to fulfill the information needs so there would not be any more missing information during the overall process and the service request would not be sent back and forth because of the lack of information (like the interviewees have told about the current situation in chapters 5.2 and 5.3). The local support is the best selection for the information acquisition channel because it is operating closely with the customer and it is easier for it to get the information than for the global support. This is called the principle of least effort and it means that the information acquisition channel is usually chosen on basis of the best suitable (Haasio & Savolainen 2004, p. 43-45). It is better that only one party is communicating with the customer and if a company's internal service, the global support, would start to ask some questions from the customer, the customer could be confused when there would be many parties who are approaching him from the same company.

So how can the local support get the information when there can be cases where the customer does not know anything about the product, only just that it is broken? The local support always needs the customer's help to get the information and in this kind of situations it can be tricky. The local support has to try to explain to the customer how he

can find and give the information. In the most difficult situations the local support has to send its own engineer to the site.

Another issue is that should the local support ask all the needed information at once or wait for when it is needed? Because not nearly all service request are escalated to the next level, to the global support, where more information is needed. Sometimes even the global support can resolve the case without all the in Table 5.1 mentioned information. So the information needs vary case by case and sometimes it is not even possible to get all this in Table 5.1 mentioned information. Like in chapter 5.3 an interviewee said that it can also complicate the situation if too much information is demanded from the customer. Therefore it is better that not all information is demanded at first but only the essential ones which have been marked as mandatory in Table 5.1. And if other information is needed later, the local support asks it from the customer.

One of the interviewees (In chapter 5.3) suggests as a solution for missing information that there should be a mask which demands the mandatory information before it is possible to send the service request. This would be a good idea for the new tool which the global support is purchasing soon. One still has to remember that there has to be a way to get help even when there is some information missing. So the process cannot be too cumbersome because of the mask and it cannot make the situation too difficult to the customer even if he would not have all the information. After all, the supports are services for the customers and they have to service the customer without making the situation too complicated.

6.4   Plan for tacit knowledge management

In previous chapters (chapters 5.4, 6.2 and 6.3) it is shown that there is need for the development of tacit knowledge management. The best way to approach the situation is to make a comprehensive plan for tacit knowledge management. It is easier to begin with the development when there is some kind plan, especially when there is no organized tacit knowledge management already.

The development of tacit knowledge management should be carried out as a project. The management has an essential role in development projects. Their support should be shown to the employees and make the employees commit to the project and new practices (Virtainlahti 2009, p. 205). When there is planned the organization for tacit knowledge management there should be considered the structure of organization and how it could be utilized in the best way. And also so that the operation would reach all the participants and it would form supporting and motivating culture for the organization. This is very important because the organization culture creates the basis for tacit knowledge management (Virtainlahti 2009, p. 210).

When planning tacit knowledge management for the global company, one has to take into consideration the global environment and that traditional methods which demand face-to-face meetings cannot be used. The sharing of tacit knowledge in a global company cannot happen without the help of IT. There have been some doubts if it is even possible to document and share tacit knowledge through the IT system but it is possible as long as there is a user perspective included (Stenmark 2002).

Knowledge management should try to bridge the gap between human-oriented and technology oriented knowledge management, between the personalization and codification strategy and between interactive and integrative knowledge management systems. Thus the organization needs a strategy which combines the handling of codified knowledge and knowledge in the collectives of employees. (Maier 2020, p. 595.)

The organization needs tacit knowledge about the old cases, case solutions, products and customers like it has been introduced in chapter 5. Any tacit knowledge which would help to resolve the a problem would be useful. Also tacit knowledge from customers and service engineers should be gathered so that R&D could utilize it. The interviewees also told that there are already arranged meetings for tacit knowledge sharing in the local supports but there is no documenting. Thus there is clearly a need for the tool that supports tacit knowledge sharing. Chapter 5.4 shows that it is profitable to integrate the technical support processes and remote monitoring processes because they need the same knowledge about the products and customers. It would be useful to acquire supporting technology that both the local and global supports and also the remote monitoring could use. In chapter 4.1 it was told that the case company is acquiring a new tool for case handling so there should be comparison between different options for the tool and if it has supporting functions for tacit knowledge sharing. The case company has to take into consideration if it is better to acquire two different tools, one for case handling and one for the sharing of tacit knowledge and integrate them, or acquire one common tool for both functions. The choice depends of course on tool options and if there is a tool that has the needed functions. The case organization has to remember that the interviews showed (chapter 5.4) that there cannot be too many systems. Otherwise the tools are not used. The system also has to be easy to use so that the knowledge inputting is as easy as possible.

Chapter 5.4 shows that there is need for channels which enable the informal communication inside the networks. Maier (2010, p. 608) calls the strategy for this kind of situation as a decentralized network and community –strategy. The goals are to reduce barriers to use ideas of colleagues, make individuals aware of the advantages of networking, build trust between individuals, establish an informal "secondary organizational structure", and enable the members of the organization to keep their personal knowledge relationships even if they take on new roles in geographically or organizationally dis-

persed areas. (Maier 2010, p. 608.) These goals are very similar to what arose as needs in the interviews (see chapter 5).

In the decentralized network and community –strategy the management support occurs as a senior manager's support of networking and acting as mentors for communities. The structure of the organization is primarily informal, mostly operating as a project which a steering committee controls and there is no separate organizational unit. The knowledge transfer and exchange happens through a network of formal and informal relationships. The IT infrastructure consists of sophisticated knowledge management system with an emphasis on communication and collaboration as well as visualization of networks, community building and support. The knowledge management system functions are communication, collaboration, knowledge search, presentation, organization, acquisition and publication. The implementation of this strategy starts with a core group e.g. a group of people enthusiastic with knowledge management as the starting unit and continues by developing communities and networks. (Maier 2010, pp. 608-609.)

The motivating of users has an essential role in the sharing of tacit knowledge. Especially when the case company is acquiring a new tool for supporting sharing and the process is new. The decentralized network and community –strategy is a motivating strategy because the goal setting procedure employs a bottom-up approach which makes sure that the knowledge needs of the networks and communities are fulfilled rather than installing a top-down goal setting procedure that does not consider these needs (Maier 2010, p. 610). Like it was established in the interviews, (see chapter 5.4) the best motivator is that the sharer benefits from the sharing somehow. One of the benefits is when there is more knowledge in the system and the users can utilize other's added knowledge. But there is a huge job to get the knowledge into the system before it is possible to utilize it. The problem was the documentation of tacit knowledge rather than the sharing the knowledge inside the local supports. Documentation ensures that the sharing is possible between the different countries and processes. One solution is the management's example and support. It motivates the participants from the top. Another solution is rewarding. It can be financial or another acknowledgement. It was noticed from interviews (see chapter 5.4) that language can be barrier for the documenting of tacit knowledge. Some field service engineers can have poor English so they do not want to write or communicate with it. Therefore there should not be too high expectations for written language in internal communication, especially if the sharing of tacit knowledge is informal. This would encourage the engineers to communicate and share tacit knowledge. But in the external channels the language has to be improved and more advanced.

The interviews showed clearly that the measurement of operating is missing from the whole support process. So before starting to build metrics for the tacit knowledge man-

agement a whole measurement system for the support process must be built. It is difficult to improve operating if there is no metrics to show what should be changed. After this it is possible to monitor also tacit knowledge management. Monitoring gives opportunity to verify the improvement in productivity (Virtainlahti 2009, p. 189). The development of meaningful metrics for measuring the value, quality and quantity of knowledge is a key factor for the long-term success and the development of a knowledge management system (Alavi & Leidner 1999, p. 22). The success of tacit knowledge management can be measured by the quality of communication in networks and communities, use and user satisfaction with community-oriented knowledge management system and knowledge-specific services offered decentrally (Maier 2010, p. 609).

6.5 Methods and social media tools for tacit knowledge management

The global environment makes the sharing of tacit knowledge more complex and it demands specific methods and tools for making sharing possible. Suitable methods for tacit knowledge management were introduced in chapter 3.4.3, supporting technology in chapter 3.5 and social media tools in chapter 3.5.1. The most suitable methods and tools for the case company were chosen and placed in a SECI model in Figure 6.3. The study is focusing on the tacit knowledge so the combination phase has less focus.
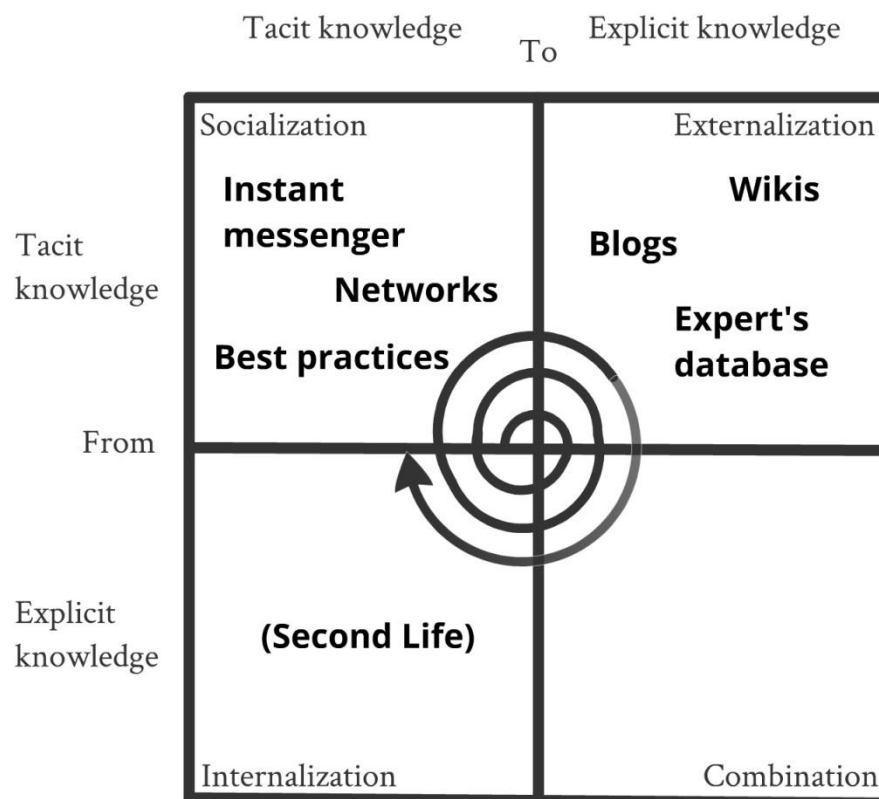

Figure 6.3. *Methods and social media tools in SECI model.*

The interview showed that there is need for some kind of an internal forum for the sharing of problems and solutions among the service engineers. The network could help itself that way. There was a need to discuss related to the topic and ask questions. These needs refer to those global networks that have a common forum where to discuss and share the best practices should be created. These methods support the transforming from the tacit knowledge to tacit. Also the instant messenger support this process and the case company actually is already using an instant messenger so there is only need to encourage employees use it more.

The wikis, blogs and expert's database support the transformation from tacit knowledge to explicit. Either all of these can be utilized or only the ones that suit the best.The wikis suit well for a situation where a topic related directory which is commonly created is needed and the searching is easy. The blogs suit well e.g. introducing new products or other development. The comments make it possible to get ideas from other users and utilize them. The expert's database is knowledge about an expert's tacit knowledge and it helps when it is needed to know who is the right person to approach with some issue or question. In chapter 3.5.1 introduced Second Life in supporting the transforming from explicit knowledge to tacit but it has not yet had wide popularity among companies and when the company is only in the beginning of developing tacit knowledge management this tool can be left with less attention at this point. But it is good to be aware of this kind of a tool also.

The company would do good by making a comprehensive plan for implementing methods and tools. The goal and the wanted results have to be clear. First one should choose only a couple of methods and tools and start working with them. The first tool could be the forum for networks which was suggested in many interviews and after that the developing of best practices is possible by utilizing the networks. Chosen tools should be part of or integrated to the case handling tool so there would not be too many tools for the support to use. The implementation should be done with some smaller group which is a small sample of the whole organization. If the group embraces the tool well a wider implementation can be executed and later also with other tools.

7 CONCLUSION

7.1 Discussion and implications

The main objective of this study was to develop the co-operation between the global and local technical supports by finding the most important information needs in both the local and global support processes and research possibilities to develop tacit knowledge management in the global support. There were two main research questions set by the goal: What information is needed in global support process? And how tacit knowledge management can be developed in global support?

RQ1: What information is needed in global support process?

When the main goal of the global support is to help the local supports and thus the end customers with the technical problems related to the product, the most information needs are naturally related to the customers and products. However, one has to remember that the background of the person effects on the information needs also. But when comparing the global support's and local support's there is very many common needs because of the common goal, even when the participants may have very different backgrounds because of the locations in different countries.

The end customer starts the service request and he has the most information about the situation. The acquisition of the information should be implemented through the local support because it operates the closest to the end customer. The information needs can vary much between the cases but the global support has often more specific and wider information needs because they have to resolve more complicated problems. This makes the situation challenging because all the cases do not escalate to the global level so there might be no need for more specific information. In these kinds of cases it is not worth of asking all the possible information from the customer when the service can be handled with very limited amount of information. And too many questions and time consuming settling also strains the customer and he may feel that the service is too complicated. In some cases the customer may not know the answers and asking makes him feel uncomfortable. So the focus has to be on only mandatory information needs, and more information can be asked if needed. One has to remember that the technical support is a customer service and the objective is to give as good as possible service to the customers.

The information needs can be divided based on their level of knowledge to data, information or knowledge. Knowledge can be divided into the explicit and tacit knowledge.

Tacit knowledge has a very important role when resolving the service cases and therefore it is important to invest in its management. The global support needs all three types of knowledge so there has to be also methods for acquiring and sharing these different kinds of knowledge.

There are many frameworks for information management but most of them proceed almost in the same way. The phases can be generalized to six phases. They are information needs, acquisition, storing, developing, sharing and utilization. The IT tools support information management and they can help to structure and create the process. Especially when the common process is missing the tools can direct the participants to operate the right way. The tool should be a part of the case handling tool so that the information inputting and sharing with different parties is as easy as possible.

There is often need for process development when talking about organizational operating. If there is not yet a modern case handling tool it is highly probable that it is in high priority in the support's development ideas. An advanced tool supports the availability of information and transparency which are also appreciated in issues in the global support. The acquisition and sharing of information and knowledge is not possible without IT tools in the global environment, at least not in an efficiently way.

RQ2: How tacit knowledge management can be developed in global support?

There is a lot of tacit knowledge in the global support and it is important that it is possible to utilize it in case resolving. However if the use of tacit knowledge is inefficient it causes duplication of work. There are meetings for sharing the tacit knowledge but the documentation is often missing. The technical support is traditionally focused on technical service and the controlled and comprehensive process for tacit knowledge management is missing.

The nature of tacit knowledge complicates the tacit knowledge management. If the organization wants to develop tacit knowledge management it has to know what kind of know-how it has and who has this know-how. It is also needs to identify the potential knowledge and understand the meaning of knowledge for business. When developing tacit knowledge management the identifying, sharing, motivating and utilization of the tacit knowledge have to be considered. The organization has to create an atmosphere which appreciates tacit knowledge and its sharing. The knowledge holders have to be identified before the tacit knowledge is lost from the company.

The sharing of tacit knowledge is the most important phase in tacit knowledge management. Often there is no sharing because the employees are afraid that they will lose their position and strengthen in turn others' positions in the organization. It is possible to have an effect on sharing by the organization culture. The success of tacit knowledge

is heavily based on sharing. The methods of sharing can be for individual or working community level and they can be informal or formal or something between them. The sharing of tacit knowledge demands in many cases face-to-face communication and showing the issue in practice. However in a global environment it is not possible communicate directly because of the distance and therefore supporting technology for sharing is needed. There are different opinions about the sharing of tacit knowledge without direct communication. Some of the researchers are claiming that it is not possible but meanwhile some of the researchers are saying that it is possible through technology if personal perspective is included. The global process does not have other options than to utilize technology so the global company has to believe the last claim. When using the supporting technology the main problem is how to get the employees to share tacit knowledge through technology when the writing, time or language can be a barrier. The best motivator for a sharer is that he benefits from sharing.

The motivating for the sharing of tacit knowledge has to be planned and implemented carefully so that the best possibilities for success are created. The tool which has been chosen to support the sharing has to be easy to use so that it does not create a barrier for the using. The users have to understand that the more they give to the knowledge base the more they can get from there. The knowledge sharer gets the benefit when there is a knowledge base and thus the training of a new employee does not take so much of the expert's time and the training is otherwise easier. There can also be either monetary or non-monetary rewarding for the sharing if it suits the organization's line. In a global environment the language can cause some problems and reduce the sharing if the sharer feels it difficult. Everybody should be able to speak the common language (often English) in a global company but if someone finds it difficult training should be arranged for him. There should not be too high demands for used language in the tool's informal functions. E.g. advanced language should not be demanded in the informal forums if the communication happens inside the company. Thus there might be more knowledge sharers when they do not need to be afraid of the language mistakes.

Tacit knowledge is often knowledge which would benefit also other support processes if they are dealing with the same products. Also e.g. a R&D unit would benefit a lot from the shared tacit knowledge and reaching it should be a goal for the R&D unit. So it is reasonable to establish a common knowledge database for all needed processes so that they all can share their knowledge and also utilize the knowledge base in their operations. Thus the database is more comprehensive and the company benefits from its use more.

The goal of tacit knowledge management is to gather, share and utilize the tacit knowledge. The management's support and encouragement for sharing and documentation has a huge impact. It makes the creation of a common target and employees' engagement possible. The knowledge strategy needs to be integrated into strategy man-

agement if it is wanted to be successful. Also a plan for the tacit knowledge management is needed. In that plan the organizational culture, technology, infrastructure and measurement have to be taken into consideration.

The culture creates the basis for knowledge sharing and thus has a huge impact for the process. The common IT-tool for tacit knowledge sharing integrates different processes which are dealing with the same issues. The tool should be a part of the case handling tool so that the use is as easy as possible for participants. The IT system helps to direct the process so it would proceed in the same way regardless of the location of participants. Procedures that are culture-bounded can be embedded into the IT tool so that the system becomes an example of organizational norms. When acquiring a new IT tool decisions about responsibilities, content producing and updating have to be done. When the case is about sharing of sensitive knowledge the knowledge sharing has to be controlled and there has to be different access rights for different parties. The IT system for tacit knowledge management can be a tool which makes possible the coding and sharing of the best practices, creation of corporate knowledge directories and creation of networks. The technical support should utilize the old cases in order to avoid the duplication of work and for gathering the tacit knowledge related to the old cases. So the IT system should integrate the case handling and the tacit knowledge sharing. The old cases would create the basis and over time there would be more and more knowledge and the old and new knowledge would develop together. When long-term success and development of tacit knowledge management are wanted, one has to use of meaningful metrics which measure the value, quality and quantity of knowledge.

The tacit knowledge can be transferred from the local support level to the global level by utilizing the methods of sharing and social media tools. The social media tools suit well for tacit knowledge management because of their social aspect and they make possible the sharing between different locations of participants. Tacit knowledge can be transferred to the tacit knowledge by utilizing an instant messenger, best practices or networks. While the transferring from tacit knowledge to explicit knowledge can be done by using wikis, blogs or expert's database. From explicit to tacit knowledge it can be done with the help of virtual worlds, like Second Life.

There has to be a clear plan for the utilization of the social media tools in tacit knowledge management if successful knowledge transferring between the local and global supports is wanted. The senior manager's support is needed and they should be as mentors for the communities. There is no need for a separate organizational unit for the tacit knowledge management as the knowledge transfer happens through a network of formal and informal relationships. The implementation of the strategy is best started with a small group of people and the development done with them and the expansion of the strategy later with a wider group. A good way is to start with one or two tools and proceed with others later if needed. The creation of content has an essential role so that

the tool will also create value later. Furthermore, the usability of the tool has a significant effect on the amount of users and their actions.

7.2   Assessment of the study

Empirical researchers ensure that the results of a study are trustworthy by assessing reliability and validity. They are the criteria for targeting the improving of quality and they are doing it by directing the assessment of research. However, it needs to be remembered that research does not aim only to faultlessness but to the new information as well. Reliability describes if it is possible to repeat the research again by using the same case and get the same the results. The validity describes how well the argument, interpretation or results express the target which they are to be referred to. (Koskinen et al. 2005, pp. 253-255.) Validity can be divided into internal and external validity. The internal validity means internal logic of interpretation and conflict freeness. The external validity answer to the question: can the interpretation be generalized to the other cases also. (Koskinen et al. 2005, p. 254; Yin 2003, p. 34.) Yin (2003, p. 34) adds the construct validity for the criteria of research quality but it is difficult to use in the case study because it describes if the right and objective metrics and methods have been used in the research. Also the internal validity does not suit very well for the assessment of this research because it studies the unambiguousness between cause and consequence. (Yin 2003, pp. 34-36.) So the suitable tools for this study are external validity and reliability. However, there have been some claims about reliability and validity, in that they are rather criteria of assessment for the quantitative research and may not suit well for the qualitative research (Koskinen et al 2005, pp. 255-256; Olkkonen 1994, pp. 38-39; Yin 2003, pp. 35-37).

The reliability of this study is good. The research is documented carefully and it is possible to repeat the interviews. It can be seen as a disadvantage that the interviews were half-structured because some of the interviews proceeded quite freely. But on the other hand it can be assumed that the same issues would have arisen in any case. One question to be considered is that did all the interviewees understand the questions in the same way. The topics might not be so familiar for the interviewees so there might have been some misunderstandings. However, this was tried to be avoided by sending the interview question beforehand and explaining the concepts. The parts of the interviews were translated from Finnish to English so there might be some small differences. And of course there is always the risk that the interviewer interprets the answers wrongly.

The external validity can suffer in a single case study because there is always the possibility that the single case cannot be generalized. But if the backgrounds of the cases are similar the generalization should be possible. However, one has to remember that every organization has its own kind of an organization culture which impacts very much to the results. The external validity is suffers if all the parties are not presented and there was

one product group missing from the group interview. However, it does not use the technical support process so much and other processes represented the missing one. Because there were so many local supports they all cannot be present in the interviews because of the limited resources. More interviews were tried to be arranged but it turned out to be difficult because of knowledge level of interviewees, time and language. It can be seen as a disadvantage that the interviewed countries were not located evenly in the world. The Asian countries did not participate at all in the study. All the local supports were given possibility to participate if not through interviews then through the Delphi method. But only 11 countries answered from the 50 to the Delphi method. It was recognized that it can be difficult to get answers through email but it was worth to the try. The reasons for the low answer level were probably in the language, unfamiliar topic and channel. However, all the gotten responses from the interviews and the Delphi method had very much in common even when they were from the different parts of the world and the results of the Delphi method supported very well the results of the interviews.

Criticism can be given toward this study because of its wide subject. Even still, it has tried to research all the parts in needed accuracy and integrate them together. The circumstances drove to use different kinds of interviews form (group interview, individual interview, phone interview, face-to-face interview, video interview) and this can be seen as an advantage and also a disadvantage for the research. The advantage was that benefits from all interview types can be utilized. But the disadvantage was that the different types of interviews may affect detrimentally on comparison. There can be also criticism toward the arrangements of the Delphi method because of its limited rounds. If there would have been more time more rounds would have been arranged in the Delphi method but even still the method gave good result even without them.

Generally the research succeeded well. The theoretical part was executed as accurately as it was possible and the empirical part could utilize and apply it. The data gathering was executed as it was planned and the interviews and the Delphi method gave a comprehensive picture of the situation. The results were consistent and it was ensured through the Delphi method. The results supported each other and they were credible.

7.3 Suggestions for future research

The global support is acquiring a new IT tool for the case handling and there has been some exploration to the available tools in the market. Next there should be research how these tools support the tacit knowledge management and are there some functions and social media tools for it. After that a comparison between tools should be made and the best tool for both the case handling and the tacit knowledge management chosen. A research should be done about how the process for the tacit knowledge sharing should be executed in operational level in the best way. A documented process would help the

employees to act in the same way and also the development of the IT tool would be easier.

A research should be done about how the project for development of tacit knowledge management should be executed. The whole project has to be planned and the scope of the execution decided. The best reference group and its selection process should also be researched. A pilot phase of the project should be planned and also how the project will proceed and spread after the pilot.

The integration between different IT systems and databases should be planned carefully and it should be studied how it can be done in the best way. One should find out out which databases and systems should be linked so that it would support the operation. A good next step would be to research the Enterprise Architecture, how the new tool would suit in it and how the Enterprise Architecture should be developed.

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APPENDIX 1: INTERVIEW QUESTIONS

Technical Support Organization and Processes

Define the technical support team. Who are the members of the team?

Describe your processes. Is there a process chart available?
- How do you define a "service request"?
- How are the service requests originated? (E.g. Internet, telephone, e-mail, etc.?)
- Do you have different originators for a service request? (E.g. customer, account manager, sales representative, third–party vendor, etc.)
- How does a case handling team communicate with a customer?
- Does the process work well? How could it be improved?
- How the field service process links to the local technical support process? (this questions only for the local supports)
- How often the cases are escalated to the next support level?
- Does the technical support process difference somehow when dealing with partner?

Define your customers.

Describe your biggest challenges.
- Are the steps and outcomes in the service process recorded somewhere as a record for others to see – e.g. regarding the global customers?
- Can anyone outside the technical support team view activity between a customer and a service case handling?

What things need to change to make technical support more effective? What things need to stay the same?
- How is customer feedback stored and shared in your organization?
- What kind of development ideas do the customers have for support processes? Have you heard any development ideas from customers?
- What kinds of metrics are followed? (E.g. case handling time, customer satisfaction etc.)

Information management

What information does technical support team need from a customer to solve the customer's problem?
- Do you need information from other products? (E.g. from Units 2 products)
- If the Unit 1 global support had common tool with Unit 2, would you find it useful?
- What kind of information do you need from global technical support? Or what kind of information do you need from local technical support?

What are the tools used today to capture customer and product related information? Do you know who is offering the tool (Microsoft, Oracle, Salesforce.com?)

- Do you know if there are any new IT tool projects going on at country level?
- Can you recommend some tool for global support use? (for the case handling)

Knowledge management

What happens to resolutions from prior service requests? Is a knowledge base in existence? Do you utilize these old cases somehow?

- Do you have any other knowledge base from customers or products?
- How should the customer, service or product/application related information from local service unit be gathered and transferred to global knowledge?
- How can the knowledge gathering or sharing be motivated?
- How the knowledge content should be classified (products/customers /applications/fault codes etc.)? How should it be easy to search?

Summary

Define three most important areas for the technical support to improve in the case management?

APPENDIX 2: CONTENT OF SENT EMAIL IN DELPHI METHOD

Dear colleague,

please take a few minutes of your time and read through this email. Your input is very much appreciated how to improve the technical support request handling from your customers and between the global technical support team. This email has sent to the local country's service managers. Please reply to this email (if you have enough knowledge about situation of technical support) and forward it also to your technical support manager and kindly ask him/her to reply to this email.

Current challenges in global technical support process
- Existing tools do not support end to end processes (from local level to global level)
- Global transparency is lacking
- Global metrics is not available
- Reuse of case resolutions is not possible in network (the old case resolutions would help to solve new service requests).

Results of the interviews in the technical support in selected countries (UK, DK, BR, MA), the following needs have been prioritized
- Common process is missing how requests are handled. A professional tool would help.
- Case handling improvements are needed, e.g. the sending back and forward the service request, urgency of cases needs have better visibility
- Knowledge sharing does not exist today and it would be very helpful to have visibility to case resolutions.

Project proposal
A proposal has been made to start a project in this area to select a tool to improve the current situation.

In order for us to have a confirmation of the requirements, we would appreciate your feedback for the **three most important improvement needs** in managing the technical support requests in your country. Please comment on the findings from United Kingdom, Denmark, Brazil and Morocco if they match your situation.

Please reply to this email by April 10th.

For more information, please contact the signed.

APPENDIX 3: THE TECHNICAL SUPPORT PROCESS FROM LOCAL LEVEL TO GLOBAL

LOCAL LEVEL

Service request	Problem solving and giving the solution if possible	Asking help from own experts if needed	Assigning the case to the service engineer if needed	Escalating the case to the HUB or global support if needed

GLOBAL LEVEL

Service request	Problem solving and sending the solution if possible	Asking help from R&D team if needed	Giving the solution to the local support	Informing sales about possible sales lead