Master's thesis (MBA)

Degree programme in Business Administration

International Business Management

2014

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TACIT KNOWLEDGE AND WEAK SIGNALS IN ORGANIZATIONAL LEARNING

– **MANAGING KNOWLEDGE TO CREATE SUSTAINABLE COMPETITIVE ADVANTAGE CASE COMPANY LTD**

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MASTER´S THESIS | ABSTRACT
TURKU UNIVERSITY OF APPLIED SCIENCES

Master`s degree programme in International Business Management

2014 | 126+10 pages

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TACIT KNOWLEDGE AND WEAK SIGNALS IN ORGANIZATIONAL LEARNING

The negative effects of the current age structure trend on the labour market and economic growth are highly significant and present a challenge in the Finnish and global economy alike. Even though the public opinion suggests that experience is highly valued as a competitive advantage in the firms some observations are in contradiction to that. When companies are forced to lay off people it often happens at the expense of the more experienced based on observation of the news. Organizations have many means at their disposal to mitigate the effects so that valuable experience does not leave the company with the senior.

In the theoretical part of the thesis knowledge creation and making it explicit is explored. Tacit knowledge which is deeply rooted in the experience of the worker and developed in time while engaging in the daily tasks is a source of competitive advantage to a company that works in a knowledge intensive business. It is important to share it, or rather facilitate the emergence of it while juniors are working with the more experienced. The tacit knowledge that can be made explicit should be codified as long as it supports the company goals. In the decision-making of the firm there is a future and past perspective. Capturing weak signals from the customer interface should be on every workers agenda and well managed it will help plan against the surprises and possibly generate growth.

This thesis is a case study of a Finnish SME company working in a knowledge intensive business area in manufacturing capacity and designing its own products. The thesis looks into the views and practices of the personnel in how experience is valued and what could be done to capture the lessons learned from the seniors before it is too late. Simultaneously it was observed what knowledge is already in explicit format and how it is shared internally. Through the answers given in the interviews best practices and development points were identified where juniors and seniors felt challenges. The thesis gives some guidelines in how the organization could be managed so that future signals from the periphery and thinking strategically would be in the minds of more people working in the customer interface in their daily tasks.

The study shows that the organization has many good practices already in place that facilitate tacit knowledge integration into new knowledge created. Some observations support the idea of the factor that the company could include the seniors more in the creation of the new knowledge to make it more efficient. Trust and openness, accepting diverse opinions and reflection together adds value and produces better decisions. Instead scanning the periphery for weak signals for threats or opportunities could benefit from more consistent practices and maybe reintroduce some old ones in order to facilitate scenario working.

Facilitating the emergence of learning and removing the barriers from flow of information are significant contributors to competitive advantage of a firm. The expert retires but the expertise should not.

KEYWORDS:

Knowledge, knowledge intensive work, organizational learning, innovation, strategy, competitive advantage, weak signals, tacit knowledge, intangible assets, product development

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HILJAINEN TIETO JA HEIKOT SIGNAALIT ORGANISAATION OPPIMISESSA

Ikärakenteesta johtuva työvoiman voimakas eläköityminen lähivuosina on koettu merkittäväksi haasteeksi sekä Suomen teollisuudelle että globaalisti. Vaikka juhlapuheet korostavat seniorien panosta organisaation voimavarana silti monet viimeaikaiset havainnot vahvistavat että työvoiman vähennystarpeessa henkilöstöä poistuu kokeneimmasta päästä uutisista tehtyjen havaintojen perusteella. Organisaatioilla on monia tapoja hallita tilannetta siten että arvokas työelämässä saatu kokemus ei poistu yrityksestä seniorin mukana.

Tutkimuksen teoreettisessa osuudessa käsitellään tiedon syntymistä ja sen muuttamista käytettävään muotoon. Hiljainen tieto, joka on muodostunut kokemuksen kautta työssä toimiessa, on merkittävä kilpailuetu yritykselle joka toimii tietointensiivisellä toimialalla. Tämä hiljainen tieto on tärkeää jakaa seuraaville sukupolville tai yhdessä toimien on luotava uusille sukupolville mahdollisuudet oppia yhdessä kokeneiden työntekijöiden kanssa. Se hiljainen tieto, joka on kirjattavissa näkyvään muotoon, voidaan kirjata, kunhan se tukee ja hyödyttää liiketoimintaa. Organisaatiossa tänään tehtäviin päätöksiin vaikuttaa menneisyyden lisäksi se mitä voidaan havaita tulevaisuudesta. Heikkojen signaalien kaappaaminen asiakasrajapinnasta voisi olla kaikkien työntekijöiden tehtävä ja hyvin hallittuna se auttaa yllättävien tilanteiden ennakoinnissa ja niihin valmistautumisessa liiketoiminnan varmistamiseksi ja mahdollisesti kasvun luojana.

Tämä tutkimus tutustuu erään suomalaisen valmistavassa teollisuudessa toimivan tietointensiivisen PK-yrityksen käytänteisiin ja henkilöstön näkemyksiin siitä minkä arvoiseksi kokemus arvostetaan ja mitä toimia voitaisiin tehdä jotta eläköityvien asiantuntijoiden opit saataisiin talteen ennen kuin on myöhäistä. Samalla kartoitettiin millaista tietoa on jo kirjallisessa muodossa ja miten se on jaettu käyttöön. Tutkimuksessa annettujen vastausten perusteella haettiin niitä hyviä käytäntöjä ja kohteita joista sekä kokemattomat että kokeneet työntekijät kokivat haasteita. Tutkimus antaa myös joitain näkökulmia miten organisaatiota voitaisiin johtaa, jotta toimintaympäristön tarkkailu ja laajempi strateginen näkemys olisi kaikkien asiakasrajapinnassa työskentelevien mielessä päivittäisessä työssä.

Tutkimus osoittaa että organisaatiolla on monia hyviä käytänteitä jotka mahdollistavat kokeneiden tiedon integroimisen uuteen luotuun tietoon. Jotkin havainnot tukevat sitä että uuden tiedon luonnin yhteydessä voisi olla hyödyllistä osallistaa kokeneita henkilöitä prosessiin sen tehostamiseksi. Luottamus avoimuus ja erilaisten näkökantojen pohtiminen yhdessä tuottaa lisäarvoa ja laadukkaampia päätöksiä. Sen sijaan tulevaisuuden uhkien ja mahdollisuuksien tarkkailuun ja jakamiseen organisaatiossa voitaisiin luoda johdonmukaisia käytänteitä ja kenties palauttaa joitain vanhoja skenaariotyöskentelyn helpottamiseksi.

Oppimisen mahdollistaminen ja tiedon kulun esteiden poistaminen ovat tärkeitä kilpailukykyä edistäviä tekijöitä. Asiantuntemuksen ei pitäisi eläköityä asiantuntijan mukana.

ASIASANAT:

Tieto, tietotyö, oppiva organisaatio, innovaatio, strategia, kilpailuetu, heikot signaalit, hiljainen tieto, aineettomat hyödykkeet, tuotekehitys

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List of Abbreviations (OR) Symbols

ATO	Assembled To Order
CKM	Customer knowledge management
COP	Community of practice
CRM	Customer relationship management
EBIT	Earnings before interest and taxes
ETO	Engineered To Order
HRM	Human resources management
KM	Knowledge management
OLC	Online Learning Center, Open Learning Centre
ROI	Return on investment

1 INTRODUCTION

The outline of this study is depicted in Figure 0 below. In this introductory Chapter 1 the objectives, main research questions, scope and limitations and methods are presented. In Chapter 2 the main literature concepts are presented and finally the theoretical framework of the thesis is drawn together. Chapter 3 features the results and conclusions of the interview. Chapter 4 includes case study analyses of observations in the case organization. Chapter 5 opens the research path for follow-up and Chapter 6 presents the summary.

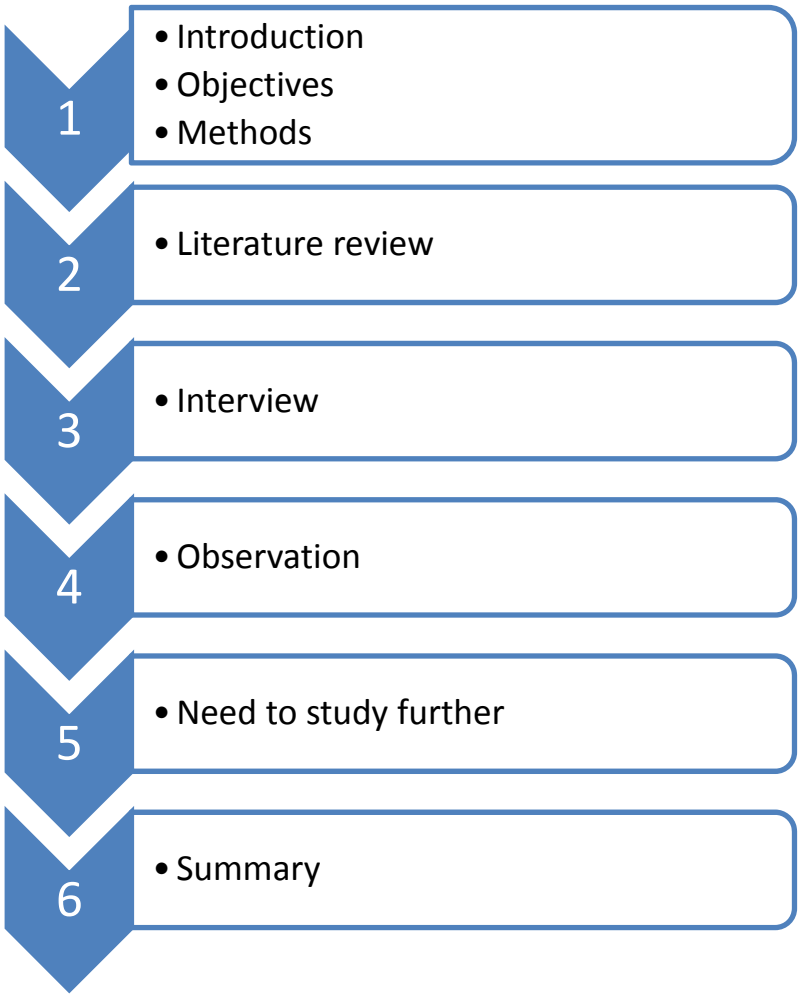

Fig. 0. Thesis structure (Korhonen 2014)

Tacit knowledge concept was originally introduced by a Hungarian chemist, economist and philosopher Michael Polanyi. He put the term in a nutshell by defining it expert scientists “know more than they can tell (Polanyi 1966: 4).” Japanese professors of international business strategy Ikujiro Nonaka and Hirotaka Takeuchi brought the concept closer to business management by writing about knowledge creating company in 1995. Tacit knowledge as concept was introduced in Finland quite recently by Hannele Koivunen in her book Hiljainen tieto (1997). She follows suite by saying that the term tacit knowledge entails personal, context specific, subjective knowledge, whereas explicit knowledge is codified, systematic, formal, and easy to communicate. Based on the fact that there has been a lot of Doctors, Masters and Bachelors level research on this subject after the millennium and the fact that the baby boomer generation is retiring there is a big need in the companies to study tacit knowledge. The companies also need to take measures to capture the experience of the people that are soon no longer in the working force. It is more and more important to relay relevant tacit knowledge to new generations in an organized way. In the worst case the experienced people will leave the company and their knowledge with them.

Organizational learning is an area of knowledge within organizational theory that studies models and theories about the way an organization learns and adapts into its environment. Organizational learning is not new, it has attracted attention at least since Chandler (1962). Prange (1999: 27) comments that one of the greatest myths of organizational learning is the ‘who question’, that is, “the way in which learning might be considered organizational”. There are those who argue that it is individuals, not organizations, who learn. In other words, learning refers to the processes of thinking and remembering that take place within an individual’s brain. Organizational learning is all about how people can as effectively as possible create a shared vision and start to commonly apply it into practice.

There is dispersion in the definition of weak signal by various researchers. Sometimes it is referred to as future oriented information, sometimes more like emerging issues. Elina Hiltunen (2010), in her new concept “the future sign” has tried to clarify the confusion between the many definitions of the term weak signal. By combining signal, issue and interpretation to the future sign one can more holistically describe the change in the environment.

Tacit knowledge and organisational learning are the two focal points of this research. Weak signals research is in a supportive role to contribute customer service interface viewpoint and will be concentrating more on short term visibility than foresight / futures perspective of the business environment. Customer service viewpoint is seen widely as all the signals received on different organizational function levels of emerging issues in the business periphery.

Research question: How to collect, organize and use tacit knowledge and weak signals from the experts working in customer interface to create competitive advantage through learning in the case Company Ltd

1.1 Objectives, research problem and delimitation

Capabilities and knowledge management has been an active field of research in the last decades and there is a wide theoretical framework in existence. Baby boomers are retiring at an accelerated rate and there is a need to capture all of that experience for the future needs. The framework for this research is founded on the literature, articles and research on the subjects of tacit knowledge, weak signals and organizational learning. The aim is to look into a case Company Ltd by means of thematic interviews and to see how the transmission of tacit knowledge is taken and the circumstances in which the company operates.

Fig. I. Research area (Korhonen, 2014)

When people are working in a company that is organized traditionally with a top-bottom management style but is working like a matrix organization organized around customer projects they may be working in a cross disciplinary way or totally laterally inside one discipline. In this setting it is crucial to find ways to facilitate the creation and transfer of experience based knowledge of the experts and the weak signals from the customer interface to return sustainable competitive advantage and order capture. The case study is applied to a company designing and manufacturing customer tailored products (ETO, ATO). How to make that knowledge usable and available in the case company is the objective of this thesis work. What will make the results usable generally is the fact that many companies are facing similar challenges.

1.2 Research methods

In scientific research you can separate the quantitative and qualitative analysis methods. They can be used however in the same research (Alasuutari 2011, 32). By using qualitative methods, participating observation and unstructured thematic interviews my main objective is to find out how employees working in a pyramid organizational structure could benefit from the lessons learned. In qualitative research the aim is to get the most out of a single observation meaning and that it will be treated ontologically. Participating observation makes it possible to gain understanding if people are acting in the way they say (Hirsjärvi, Remes, Sajavaara 2000, 199) and receive direct information on individual, group or organizational behaviour (Hirsjärvi, Remes, Sajavaara 2000, 200).

Qualitative research is interested in understanding and in the meaning of the subject matter. Qualitative research also creates a direct link between the researcher and the examinee. (Kananen 2008, 25) Teschi (1991 in Hirsjärvi et. al. 2000, 154) concludes that the commonality between different qualitative methods are that they emphasize the importance of social phenomenon and the need to take that into account while describing, interpreting or explaining communication, cultural or social activity.

The starting point of qualitative research is to illustrate real life. It aims for a comprehensive approach so the reality cannot be broken into parts. Qualitative research allows the discovery of multidirectional relationships. It can be also stated that the aim is to discover and reveal things rather than prove them. (Hirsjärvi, Remes, Sajavaara 2000, 152)

This method is chosen to allow people to bring out their ideas and attitudes towards knowledge transfer with open questions that merely lead into the subject of knowledge and tacit knowledge and invite to reflect rather than ask specific questions. Second step is to mirror the responses against observations in the organization.

In acquiring the material a thematic interview of the experts was performed. Typical to this style is that the subject of the research is known but the questions are not specifically formulated and asked in the same way from all interviewees. This can be considered as an intermediate between a structured interview and an open interview (Hirsjärvi, Remes, Sajavaara 2000, 195). Thematic interviews are typically used when the research subject is sensitive or poorly made aware of (Metsämuuronen 2006, 113). Thematic interviews allow the interviewee to surface his ideas and the theme is possibly seen from multiple levels (Hirsjärvi, Remes, Sajavaara 2009, 164).

2 LITERATURE REVIEW

There is a great deal of recent research on the subject areas of tacit knowledge, weak signals and organisational learning.

2.1 Ageing and expected retirement age

According to the Statistics Finland (Figure II) this is the age pyramid of Finnish population at the end of 2012.

Statistics on the structure of the population describe Finnish and foreign citizens permanently resident in Finland. At the end of 2012, there were 891,392 children aged under 15 in Finland and 3,517,089 persons aged between 15 and 64. The number of persons aged 65 and over exceeded one million during 2012 and there were 1,018,193 of them at the end of 2012.

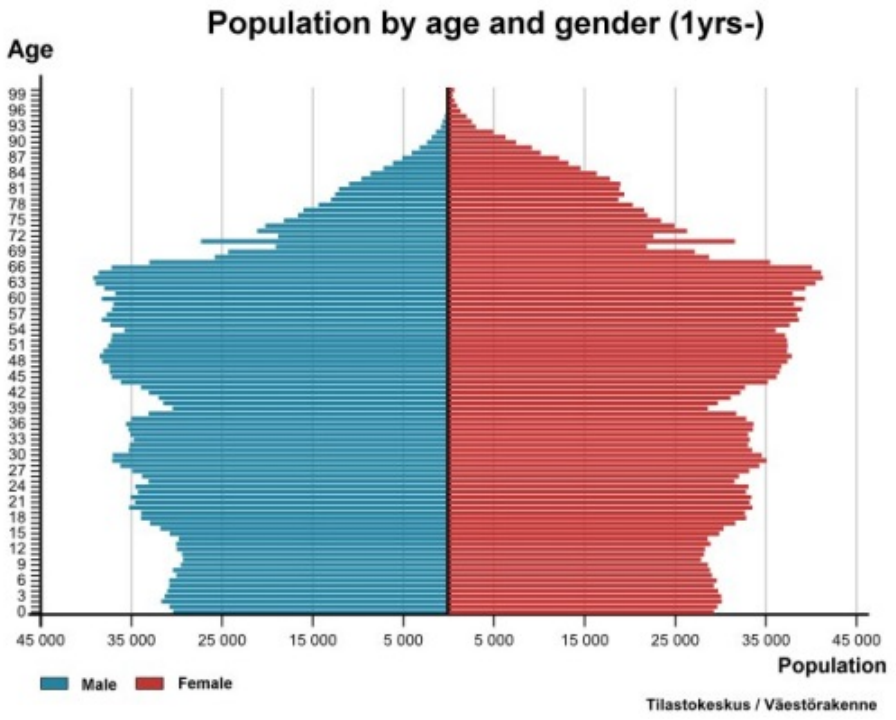

Fig. II. Population by age and gender (Statistics Finland 2012a)

The negative effects of the current age structure trend on the labour market and economic growth are highly significant for the funding of the welfare society. (Statistics Finland 2012b)

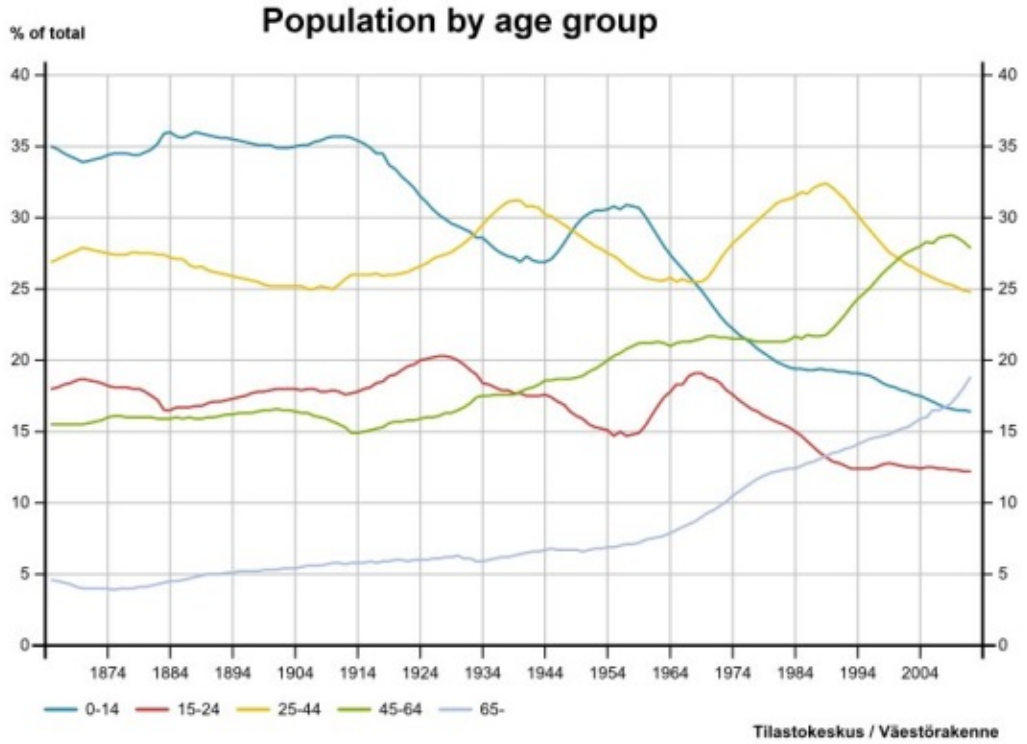

Fig. III. Population by age group (Statistics Finland 2012b)

According to Statistics Finland's statistics on the population structure, the official total population of Finland at the end of 2012 was 5,426,674, of whom 2,666,622 were men and 2,760,052 women. The demographic dependency ratio that is the number of those aged 15 or under and 65 or over per 100 working age persons was 54.3 at the end of 2012. The demographic dependency ratio was last higher than this in 1964. The Finnish population is ageing and the number of births is falling at the same time. The decline in the number of births in conjunction with population ageing and unemployment is weakening the economic dependency ratio in Finland. Finland’s age structure is skewed, as in many other developed countries. As the baby boomers retire, funding and support for the welfare society will fall on increasingly smaller age groups. (Statistics Finland 2012c). In the Northern hemisphere, the expected talent gaps will be caused mainly by demographic shifts – notably, the retirement of baby boomers (World economic forum 2011, 11).

According to Finnish Centre for Pensions in 2012, the expected effective retirement age in the earnings-related pension scheme was 60.9 years, i.e. 0.4 years higher than in the previous year. The expectancy for 50-year-olds also increased 0.3 years from the previous year. In 2012, it was 62.7 years. The expectancy for both 25-year-olds and 50-year-olds has now increased by almost two years from the level preceding the 2005 reform of the earnings-related pension acts.

In the last few years before the reform, changes to the effective retirement age were comparatively small. The effective retirement age increased as much for men as for women in 2012. The difference between men and women in the expected effective retirement age has grown smaller in the last few years. It is now possible to say that there hardly is any difference anymore: men and women retire at the same age, according to the expectancy. (Statistics Finland 2012d)

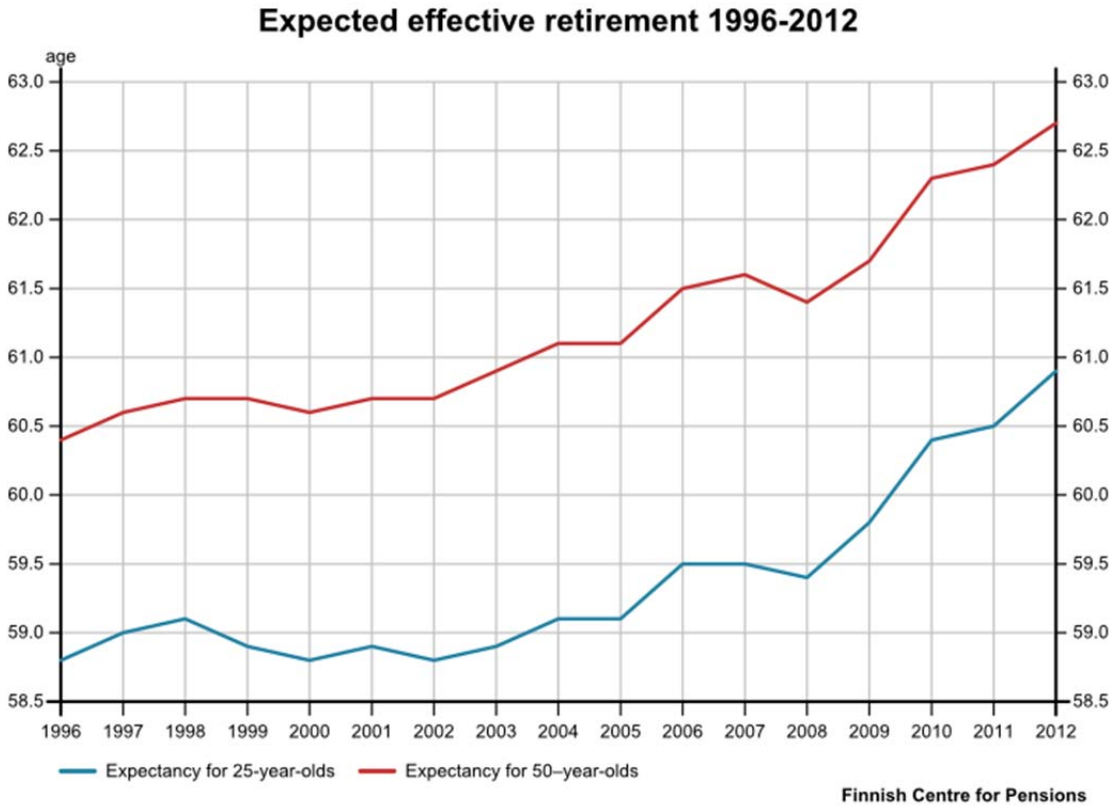

Fig. IV. Expected effective retirement 1996-2012 (Statistics Finland 2012e)

The expected effective retirement age depicts the average expected age of actual retirement that is formed for insured persons of a certain age, when presuming that starting pensions for a certain age group and mortality rates remain at the level of the year under review. The expected effective retirement age is calculated both for 25-year-olds and 50-year-olds. The indicator was introduced in 2003. (Statistics Finland 2012f)

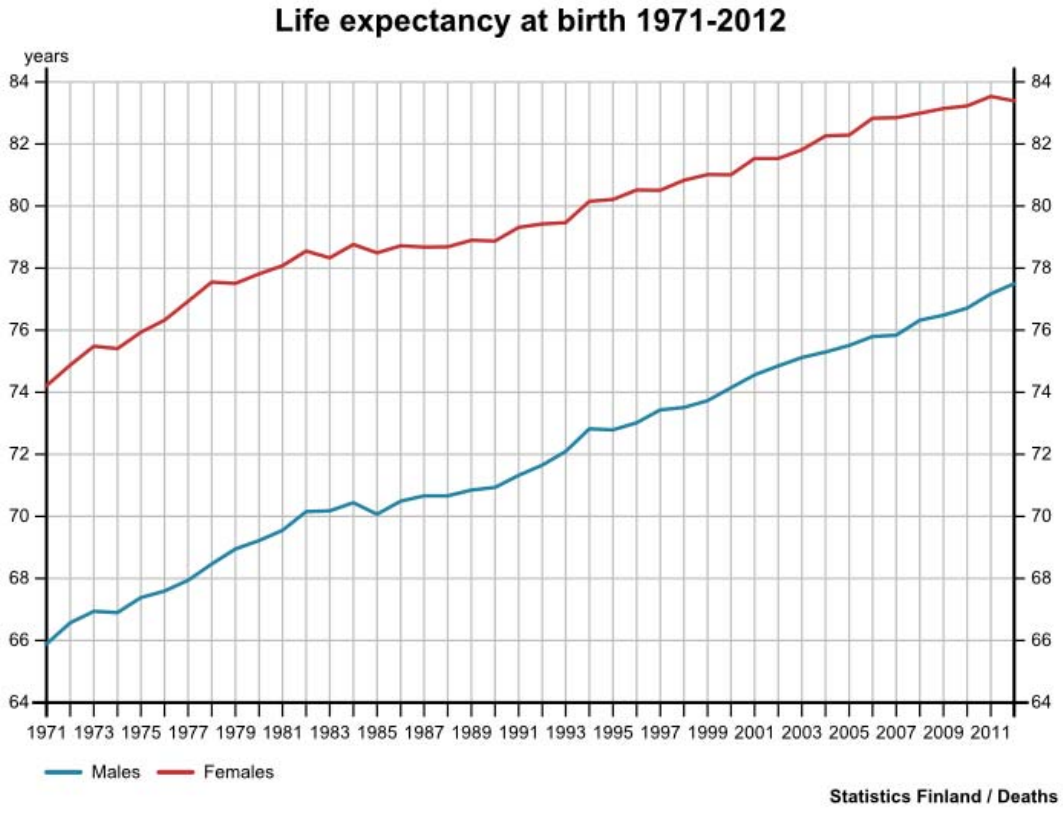

Fig. V. Life expectancy at birth (Statistics Finland 2012g)

Life expectancy means the number of years that a person of a given age would live provided that the rate of mortality remains unchanged. The life expectancy of 0-year-olds indicates the number of years a person aged 0 would live provided the rate of mortality remains unchanged. The grown life expectancy of men and women at age 0 proves that the increase in the number of deaths from years 2005–2009 has been caused by grown numbers of aged men and women, and the ageing of the population, rather than by risen rate of mortality. (Statistics Finland 2012h)

As a summary a worker today independent of the gender has the expectancy to retire at just under 63 years of age but likelihood to effectively retire at under 61 years. Finland has in tri-party agreed that the retirement expectancy in 2025 will be 62.4 years. In 2012 retirement has already been delayed to 60.9 years. There are still also more people leaving the work market than entering it in 2012 (EK 2014).

In the near future when the baby boomers retire, retire a large number of experts from various sectors. The Finnish economy is largely based on knowledge, skills and expertise. Expert knowledge and capabilities are a source of competitive advantage. In knowledge work, knowledge and capability are intrinsically linked to the person, a specialist. Their retirement puts

every organization at risk of losing its human and social capital that is important for its success. Human capital can be defined as the stock of competencies, knowledge, social and personality attributes, including creativity, cognitive abilities, embodied in the ability to perform labor so as to produce economic value. Social capital can be defined as the networks of personal relationships developed over time that provide the basis for trust and cooperation. Social capital makes possible the achievement of ends that would be impossible without it.

The central premise of social capital is that social networks have value. Social capital refers to the collective value of all "social networks" and the inclinations that arise from these networks to do things for each other by norms of reciprocity. In sociology, social capital is the expected collective or economic benefits derived from the preferential treatment and cooperation between individuals and groups. Although different social sciences emphasize different aspects of social capital, they tend to share the core idea that “social networks have value".

Although social capital takes many forms each of these forms has two characteristics in common; they constitute some aspect of the social culture and they facilitate the actions of individuals within the structure (Coleman in Nahapiet&Ghoshal 1998, 244).

According to Finnish statistics 69% of the persons aged 15-64 are employed. When people aged 60-64 represent 7,2% of the total population this means that 11% of the labour force are age 60-64 and likely to retire in the next few years. That is close to 270000 people.

2.1.1 Knowledge intensive industry

Large companies no longer corner the market for professional management skills;in fact, more and more observers believe managers cannot necessarily run anything in the absence of industry-specific knowledge and experience. (Porter 1987, 10;Paloniemi 2006, 443)

Although a given firm may possess more or less of any particular resource, only those resources that are rare, valuable, and difficult to imitate provide a sustainable competitive advantage (Ambrosini& Bowman, 2008;Amit& Schoemaker, 1993;Barney, 1991;Schoenecker& Cooper, 1998;Hamel& Prahalad 1994, 224-228;Badaracco 1991;Hamel 1991;Teece 2001, 142).

At present Finland’s assets are increasingly based on knowledge and know-how, good education and high-standard research. Finland cannot afford to lose these strengths but has to develop them through collaborative effort to meet new challenges. (Science and Technology Policy Council of Finland 2003, 39) A recent study estimates there will be a potential shortage of about 40 million high-talent people across the world in the next two decades (GTCI 2013, 19).

According to Global Talent Competitiveness Index Finland is ranked 4th in the world for lifelong learning that is measured by further education and training climate and ranked no 13 in the percentage of tertiary-educated workforce (2010) which is considered to measure the ratio of knowledge workers of the working population. (GTCI 2013, 123)

Finland specialises in knowledge-intensive sectors and the share of manufacturing in total value added is 16.9 %, which is higher than the EU average of 15.3 %. Technology industries that include electronics, machinery and metals are the largest employers, with 250 000 directly employed. (European commission 2013, 2)

- Population growth in the past allowed the renewal of production structure and strong output growth
- In the 2010s the aging of population decreases the importance of labor input as a source of growth (see chart VI)
- Economic growth must come from the growth in labor productivity (Liikanen 2014)

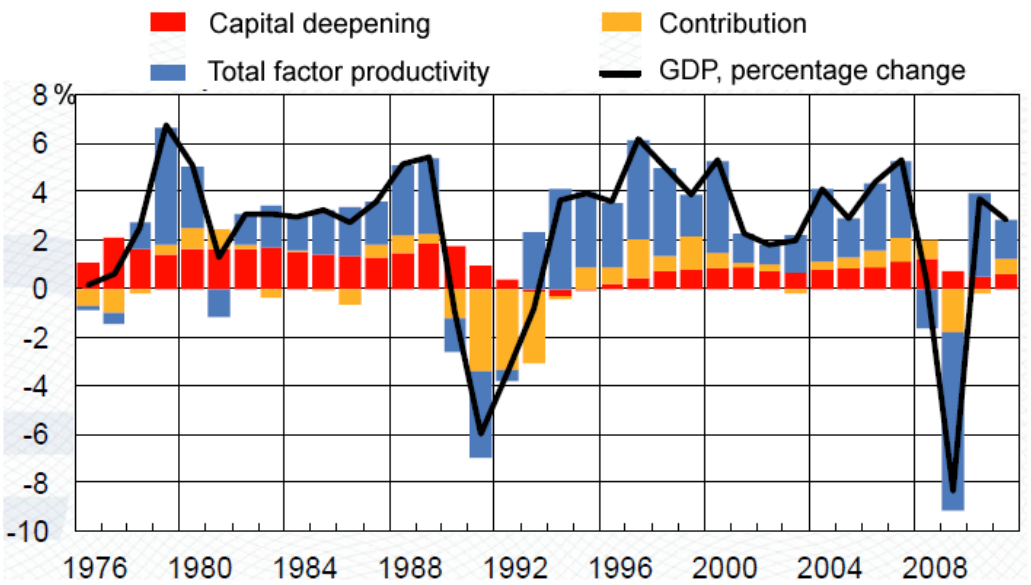

Fig. VI. GDP growth and its factors in 1976-2011 (Liikanen 2014)

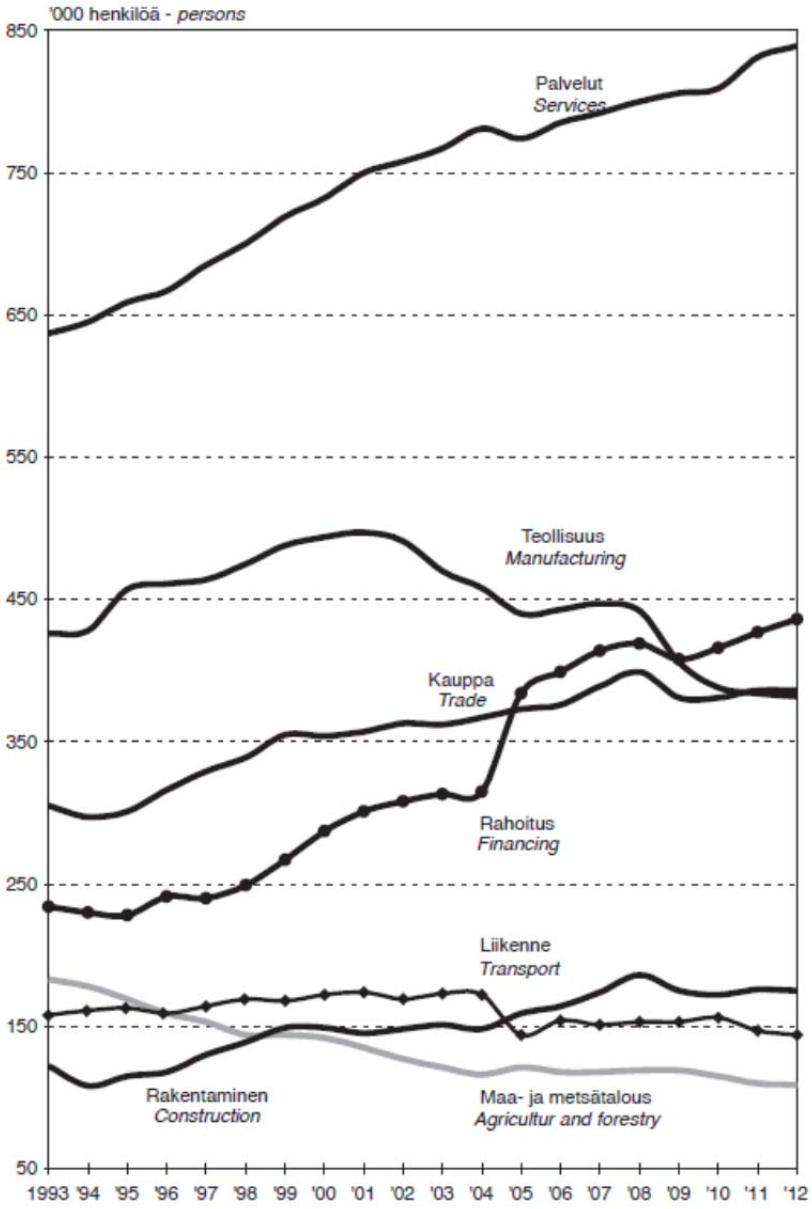

Fig. VII. Employed persons by industry (Työpoliittinen Aikakauskirja, 2013)

In the figure VII above there is an illustration on how different industries have developed over the last two decades in terms of their ability to employ people. The trend is inevitably from investment intensive industries towards knowledge based industries and services.

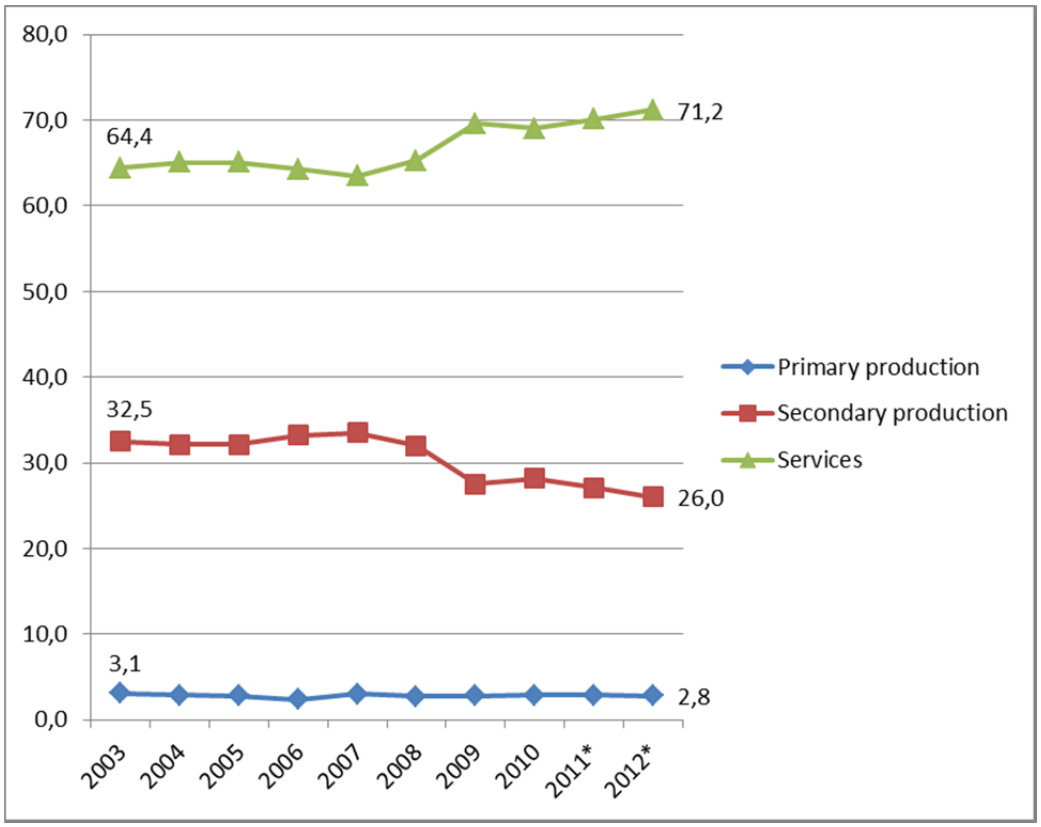

Fig. VIII. Gross domestic product by industry % (adapted from Statistics Finland 2013)

The figure VIII above displays similar development in terms of industries impact on Gross domestic product contribution. Primary production includes agriculture, hunting, forestry and fisheries. Secondary production includes manufacturing and construction. Services include trade, transportation, accommodation and food service activities, communications, finance, insurance, real estate activities, professional and other business services, arts and entertainment and public and other services.

2.1.2 Summary

From the amount of people that are over 15 years old and are theoretically able to work full time more than 22% are already older than 65 years old.

In 1990 there were 8500 employed people aged 60-74 and 2012 there were 220000. In 1990 there were only 1000 unemployed people aged 60-74 and in 2012 there were 12000. (Kauppalehti 2014, 14)

There are still more people leaving the work market than entering it in 2012 and there are approximately 270000 about to retire in the next few years. There will be a potential shortage of about 40 million high-talent people across the world in the next two decades.

The dependency ratio is growing weaker every year from working labour point of view as the baby boomers are retiring. Expected effective retirement age is being raised throughout the western world to manage the dependency ratio. At the same time life expectancy is increasing. This will either lead to an average 16 yearlong leisurely “third life” as a senior person in sound health or to a vast potential in the labour market to utilize the long experience of these people in consultation and mentoring assignments.

The Japanese view their senior workers respectfully and value their opinions. There the managers often retire in two phases. First at around the age of 58 they move aside from the day-to-day management activities. Often they remain senior advisers in the company. Some of them may move to the daughter companies or parallel organizations within the company. The second phase is around 65 years of age when they retire from the company they worked most of the life in. At this phase quite many start a consultancy business if they still can maintain their contact network. People generally want to share their experience and new leaders want to utilize it. Final retirement in Japan often happens around 70 years of age. There is a drastic difference compared to Finland in terms of attitudes.

The former president of a Finnish energy sector company Neste, Uolevi Raade, after his retirement once said in an interview that he was expecting the doorbell to ring and people, especially students, to come in and ask for his advice and views on issues. The doorbell never rang. Apparently it is an unwritten rule that you do not really contact your predecessor but try to make your own way. No-one is irreplaceable but it is a great shame to waste all that experience.

In research relating to ageing people it is often emphasized that old stagers are not valued and their know-how is not seen to have value in western countries. There are lots of negative preconceptions that prevent identifying and transferring tacit knowledge. (Raili Moilanen in Toom et. al. 2008, 236)

Tacit knowledge is not always necessarily connected to age even though connecting experience and tacit knowledge raises strongly the standpoint of age and time perspective. (Raili Moilanen in Toom et. al. 2008, 237;Joe et. al. 2013, 924)

The Federation of Finnish Enterprises president Mikko Simolinna (2014) just took floor and proposed taking off pension related payments from people already in pension to facilitate their return to work if they so choose. From approximately 300000 persons between 63-67 years of age 10 percent are working part time or temporarily. Many more are in good health and have skill to use Simolinna continues. They could be used in areas where there is shortage of skilled labour. This could mostly boil down to attitudes when 50 year olds are already experiencing difficulties in re-employment if terminated from employment.

2.2. Knowledge

“Knowledge is experience. Everything else is just information.” - Albert Einstein

According to Webster's Dictionary (2013), knowledge is "the fact or condition of knowing something with familiarity gained through experience or association" and “information, understanding, or skill that you get from experience or education” or as a clear and certain perception of something;the act, fact, or state of understanding. The concept of knowledge originates from Plato (427–347 B.C.) and Aristotle (384–322 B.C.) times. Plato defined knowledge as “justified true belief“. Plato also separates intellectually reachable theoretical knowledge (greek *theoria*) from craft (greek *tekhne*). Aristotel in turn emphasized the systematic acquisition that is based on a correct method. (greek *meta hodos* = along the road).

The word knowledge (tieto) in Finnish language dates back to 1500`s. In the Finnish etymological dictionary (2013) knowledge is derived from the word road (tie). So the word has a more functional origin when knowing and knowing the road have led the traveller to his destination. In Finnish language the word for knowledge (tieto) is very multi-dimensional and is used in place of knowledge, information, data and fact which all in turn in English have separate words. This may confuse people when confronting the term knowledge. Knowledge can be understood as information that is connected to a context and influenced by the persons own intellectual properties like values, power of observation and insight.

Rather than regarding knowledge as something that people have, it is suggested that *knowing* is better regarded as something that they do. *Embrained knowledge*: is knowledge that is dependent on conceptual skills and cognitive abilities. *Embodied knowledge*: is action oriented and is likely to be only partly explicit. *Encultured knowledge*: refers to the process of achieving shared understandings. Cultural meaning systems are intimately related to the processes of socialization and acculturation. *Embedded* knowledge: is knowledge which resides in systemic routines. Embedded knowledge is analyzable in systems terms, in the relationships between, for example technologies, roles, formal procedures, and emergent routines. *Encoded knowledge*: is information conveyed by signs and symbols. To the traditional forms of encoded knowledge, such as books, manuals and codes of practice, has been added information encoded and transmitted electronically. (Blackler 1995, 1023)

Frank Blackler also maintains, albeit expressing a doubt that there is no empirical investigation, that in organizations and knowledge types inside knowledge work the trend is from FOCUS ON FAMILIAR PROBLEMS towards FOCUS ON NOVEL PROBLEMS and from EMPHASIS ON CONTRIBUTIONS OF KEY INDIVIDUALS towards EMPHASIS ON COLLECTIVE ENDEAVOUR. (Blackler 1995, 1030). This seems so true in the day and age of crowdsourcing

and teamwork. Knowledge is embedded and carried through multiple entities including organizational culture and identity, systems, documents, policies, routines and employees. Thus, the researcher believes that knowledge is the understanding of information and its associated patterns.

In contrast, Leonard and Sensiper describe knowledge not as a dichotomy but as a continuum: "Knowledge exists on a spectrum". At one extreme, it is almost completely tacit, that is semiconscious and unconscious knowledge held in peoples' heads and bodies. At the other end of the spectrum, knowledge is almost completely explicit or codified, structured and accessible to people other than the individuals originating it. Most knowledge of course exists between the extremes. (Leonard& Sensiper, 1998: 113)

In the business context, we define knowledge as information that is relevant, actionable, and based at least partially on experience. Knowledge is a subset of information; it is subjective; it is linked to meaningful behaviour; and it has tacit elements born of experience. (Leonard& Sensiper, 1998: 113; Otala, 2008, 51;Virtainlahti 2009, 24 -25)

Knowledge is the residue of thinking. Knowledge comes from experience. However, it is no just raw experience. It comes from experience that we have reflected on, made sense of, tested against others experience. It is experience that is informed by theory, facts and understanding. It is experience we make sense of in relation to a field of discipline. Knowledge is what we retain as a result of thinking through a problem, what we remember from the route of thinking we took through the field. (McDermott 1999, 106) Explicit knowledge is for everyone to find and use but tacit knowledge separates the masters from the common (Lawson& Lorenz, 1999)

Davenport and Prusak define knowledge as a fluid mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates in the minds of the knowers. (Davenport& Prusak, 1998, 5) In organizations it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices and norms. (Davenport& Prusak, 1998, 5; Thompson et. al. 2009, 327)

The trend is that everything is becoming more and more complex. We know more and more about smaller and smaller amount of substance. The knowledge that is implicit in communities and relationships is often accessible only in a social context. In the table 1 below there is an example of a classification of knowledge types and their properties.

Table 1. Knowledge types and properties (Barth 2000)

Key info and intellectual assets	What is their value?	How to leverage?	Who owns the asset?
Explicit • Transaction data • Work products (docs) • Research notes, etc. • E-mail and correspondence • Patents and intellectual property	Valuable	Collect	Organization
Tacit • Experience • Expertise • Relationships • Reputation	Invaluable	Connect	Individual
Implicit • Conversations • Trust • Values	Intangible	Cultivate	Community

Explicit knowledge is most likely the property of the firm. One way or another it is either data or work product. But since tacit knowledge cannot be codified, it effectively remains the property of the knowledge worker. Companies have certainly tried to own this knowledge. While they are employed by the company, knowledge workers are ethically - and sometimes contractually - prohibited from sharing their knowledge with competitors. But if the knowledge worker leaves the firm, they would take that knowledge and its inherent value with them. In the final analysis, it matters less how you define knowledge management than how you practice it. It means nothing if you do not take knowledge and turn it into customer value. (Barth 2000b)

How is knowledge created? Following Schumpeter (1934) has argued that all new resources including knowledge are created through combination and exchange. Penrose (1959, 53) observes that learning embedded in shared experience develops increasing knowledge of the different options for action and the ways in which action can be taken by… the firm.

Revisiting Polanyi opens a link between him and Albert Einstein. Polanyi states that Gestalt is the outcome of the active shaping of experience through the pursuit of knowledge which is indispensable tacit power by which all knowledge is discovered and held true (Polanyi 1966, 6).

This means that knowledge in the form of justified true belief comes from experience and from that comes the ability to see the outcome of actions before they are taken.

2.3 Capturing knowledge

In the turn of the millennium some researchers were still viewing the capture of knowledge as the main challenge for knowledge management. The most common use of technology in KM was to create a repository of so called structured knowledge. Recently there has been a trend towards recognising that there are aspects of knowledge - broadly 'what people know' - which cannot be articulated, abstracted, codified, captured and stored. (adapted from Hildreth& Kimble 2002, 2)

The researcher believes that most approaches to the management of the soft knowledge are flawed and that the industry is in danger of falling into the same trap as previous attempts - simply trying to capture, codify and store knowledge – weather it is named KM, IRM or Big Data. Knowledge management is a process – not a method.

Finerty (1997) points out that technology has a role to play, but that the emphasis needs to move from trying to package knowledge as an object to using technology as a way of sharing experience. This view is supported by Davenport and Prusak (1998) who emphasise the potential of technology as a means to create links between people: ...the more rich and tacit knowledge is, the more technology should be used to enable people to share that knowledge directly. It's not a good idea to try and contain or represent the knowledge itself using technology (Davenport& Prusak, 1998, 96).

Keys to success for a successful KM project (adapted from Davenport et. al. 1998, 50)

- Link to economic performance or industry value
- Senior management support
- Technical and organizational infrastructure
- Standard and flexible knowledge structure
- Multiple channels for knowledge transfer
- Clear purpose and language
- Change in motivational practices
- Knowledge friendly culture

Companies must capture the knowledge of internal and external specialists so that others in the organization can benefit from it. This requires robust, easy-to-use knowledge management processes and systems. Some companies categorize each project up front according to the insights it is likely to generate (for example, “distinctive,” “proprietary,” or “common”) and create a road map for how insights should be documented and shared (Dewhurst et. al. 2013, 8)

2.4. Tacit Knowledge

The term tacit comes from Latin word *Tacitus* and means to be silent, passed in silence, not spoken of, kept secret, unmentioned, not openly expressed or stated, but implied; understood, inferred to mention a few. Combined with the idea of knowing more than one can tell the term tacit knowledge implies that there is knowledge within us that we act on but cannot explicitly describe it. Tacit knowledge is therefore a form of knowledge that is highly personal and context specific and deeply rooted in individual experiences, values and emotions.

The most common application of tacit knowledge is to problem solving. Herbert Simon (Simon in Leonard& Sensiper 1998, 114) has argued that the reason experts on a given subject can solve a problem more readily than novices is that the experts have in mind a pattern born of experience, which they can overlay on a particular and use to quickly detect a solution.

The expert recognizes not only the situation in which he finds himself but also what might be appropriate for dealing with it. (Leonard& Sensiper 1998, 114;Yielder 2004,113;Tichy& Bennis 2007, 7)

There is a story about a repair man that was called in to investigate steam piping that was blocked in a steam ship. The repair man was knocking the pipes with a small hammer and listening to the sound they made. Then he thought about his findings for a while. Then he picked up one bigger hammer slammed one specific location very hard and the machinery started to work. Later the repair man sent an invoice of 1500€ for his work. The steam ship owner thought that the amount was too high for the work – really he had only been knocking the pipes for a short while. The owner wanted a clear separation between the billable items.

He received a new invoice that said:

Steamship pipe repair

Big hammer hit	30€
Knowing where to hit	1470€
Total	1500€

The ship owner paid the invoice. (Toivonen, Asikainen 2004, 5)

An expert has a mature and practiced ability of observation and he intuitively understands what the goal is and what needs to be done. In a typical situation an expert does not actively think, resolve a problem or decide, but acts – correctly and well. (Toivonen& Asikainen 2004, 30)

In the West, intuitive knowledge has often been devalued in favour of rational scientific knowledge, and the rise of science has even led to claims that intuitive knowledge is not really knowledge at all. However, recognition of the difficulties inherent in transferring knowledge from

one person to another has tended to highlight the importance of tacit knowledge e.g. notably in the writings of Polanyi (1966), and Nonaka and Takeuchi (1995). It is argued that while new knowledge is developed by individuals, organizations play a critical role in articulating and amplifying that knowledge.

The word ”intuition” comes from the Latin word itueri – to see – which means ”too see within”, “consider, reflect” and “immediate insight of the essence” and “the power or faculty of attaining to direct knowledge or cognition without evident rational thought and inference”.

Polanyi (1959) describes intuition as realization that illuminates the chasm between tacit knowledge and focused knowledge. Focused knowledge is explicit knowledge that defines and makes visible the subject the person is dealing with but the essential part of processing the data comes from tacit knowledge. Technical tacit knowledge is the visible part of an expert’s know-how. Cognitive tacit knowledge in turn is mostly important in decision making, problem solving and distinction between essential and non-essential.

In Gourlay`s (2006) opinion, the tacit knowledge term has been applied to both articulable and in-articulable knowledge. He suggests that in the interests of clarity use of the term should be limited to the latter. By in-articulable Gourlay means that tacit knowledge cannot be expressed in written or verbal form.

Applying the use of tacit knowledge perspective in decision making can be hard to understand if the term is not familiar. You can test the amount of tacit perspective in a decision making situation by asking “How to decide”:

- When a high level of uncertainty exists
- When little precedent exists
- When variables are less scientifically predictable
- When facts are limited
- When several, plausible alternative solutions exists
- When time is limited

It is immediately apparent that intuition can be all inclusive, allowing the manager to recognize a problem and create a solution without so much as passing any of the decision or problem solving stages described by rational decision models. Many effective decision makers were described by their colleagues as having “an immense instinctive feel,” “a high quality of understanding,” and “an intuitive sense of the business” (Eisenhardt 1999). This intuition gives managers a head start in recognizing and understanding strategic issues.

Another way to understand tacit knowledge is that it is used in three purposes: to find problems; to solve problems; and to predict and anticipate problems e.g. in a business context. In problem

finding, the ability to develop a mental model and map of the problem is highly related to the internal store of tacit knowledge. There appears to be a strong interaction between explicit and tacit knowledge and the two seem to go hand-in-hand in creating good decisions (Bennett III 1998, 592;Yielder 2004, 61, 100;Davenport& Prusak, 1998).

Tacit knowledge is important because expertise rests on it and because it is a source of competitive advantage as well as being critical to daily management. (Nonaka 1994, 19;Baumard 1999, 8, 22;Saint-Onge 1998,19;Suppiah& Sandhu 2011, 464). That value-creating capability resides in the know-how or tacit knowledge of the engineers, managers and marketing staff and this dynamic tacit knowledge capability creates sustainable competitive advantage (Teece, 1998;Dewhurst et. al 2013, 4). These subject matter experts must be able to fit into an automated system that allows tacit knowledge dispersal and tacit knowledge use by both the experts and the rest of the firm's staff and depends to a large degree on the KM systems that are employed (Maybury et al 2000, 12).

Tacit knowledge is a tremendous resource for all activities – especially for innovation. The tacit dimensions of individual knowledge are not publicly available except as embodied in people to be hired, and the tacit dimensions of collective knowledge are woven into the very fabric of an organization and are not easily imitated. (Leonard& Sensiper 1998, 127;Stonehouse& Pemberton 1999, 141)

Therefore, tacit knowledge is a source of competitive advantage. (Nonaka 1991;Leonard& Sensiper 1998, 127;Spender 1996, 72;Panahi et. al. 2013 ,9;Seidler-de Alwis& Hartmann 2008, 138;Mayfield 2010, 24)

Innovation can help firms to build and sustain competitive advantage. Indeed a firm`s survival depends mostly on its ability to innovate. Innovation depends on knowledge. Cavusgil et al. (2003) examine how firms acquire tacit knowledge from partner firms and how the extent of inter-firm tacit knowledge transfer affects company`s ability to innovate. The authors` research among 182 US manufacturing and service companies reveals that the stronger the relationship between two firms the greater will be the extent of tacit knowledge transfer between them. Tacit knowledge transfer boosts effective innovation. (Cavusgil et al. 2003, 15, 20;Koskinen& Vanharanta 2002, 63;Leonard& Sensiper 1998, 127) Size of the firm does not affect tacit knowledge transfer.

Nonaka and Takeuchi have described (Nonaka et. al. 2000, 5) in their SECI-model (Figure IX below) knowledge transfer process spiral that has a clear link to the research on intangible capital and value creation. This spiral illustrates the creation of a new concept in terms of a continual dialogue between tacit and explicit knowledge. Methods for combination are e.g. sorting, adding, categorizing, creating methods, processes and best practices. Methods for internalization are e.g. codifying knowledge, giving access to it and goal oriented training. Methods for socialization are e.g. sharing experiences, observing, imitating and brainstorming without criticism. Methods for externalization are e.g. writing it down, creating metaphors and analogies and modelling.

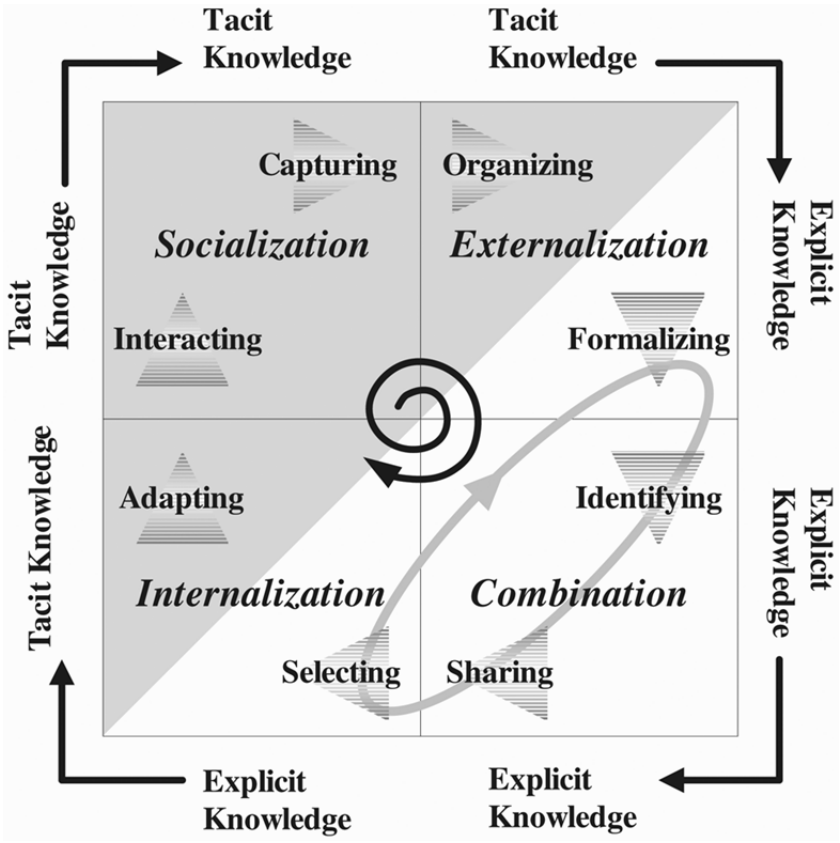

Fig. IX. Knowledge transfer process spiral (Nonaka et. al. 2000, 5;Nonaka& Takeuchi 1995, 71)

Knowledge should be made to flow in accordance with the SECI-model through socialization, externalization, combination and internalization before it becomes permanently knowledge that you can leverage. (see also Nonaka 1994, 18) Knowledge transformation process proceeds with intangible capital (Hussi 2004, 45;Nonaka et al. 1995, 72) from individual level expanding into organization creating learning and development. SECI-model can be utilized in intellectual capital management.

Organizations play a critical role in mobilizing tacit knowledge held by individuals and provide the forum for a "spiral of knowledge" creation through socialization, combination, externalization, and internalization. All of these conversion modes interact in a dynamic and continuous "entanglement" to drive the knowledge creation process. These modes operate in the context of an organization and, while acknowledging the role of individuals as essential actors in creating new knowledge, the central theme is to address the processes involved at an organizational level (adapted from Nonaka 1994, 34).

It seems that the current division to tacit and explicit knowledge is not enough to describe the phenomenon. It has been proposed by Anu Puusa and Mari Eerikäinen (2010) that tacit knowledge comprises of different types of knowledge some of which can be made explicit. That is illustrated in the figure X below.

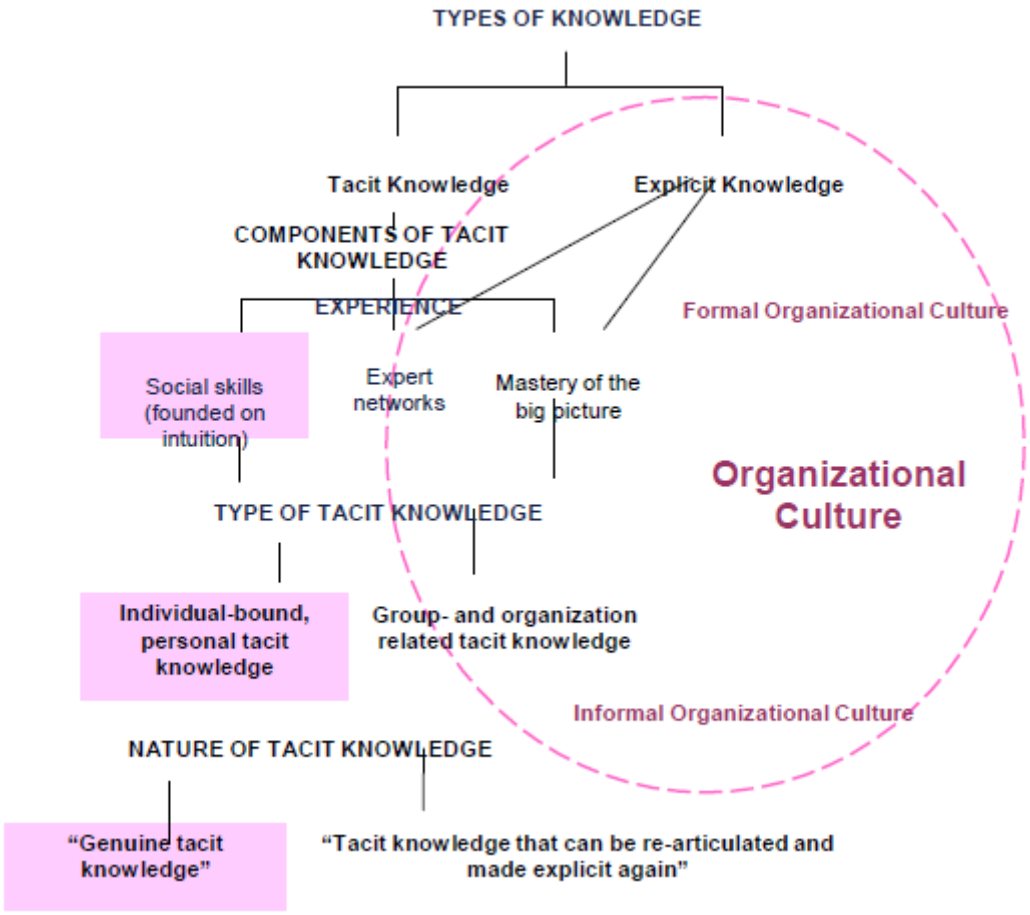

Fig. X. The nature of tacit knowledge and its interrelation with explicit knowledge (Puusa, Eerikäinen 2010, 315)

In working life we find many epitomes of tacit knowledge such as intuition, rule-of-thumb, gut feeling and personal skills. These can be classified into two dimensions, the technical and the cognitive dimension.

If an organization develops and provides products or services which require to be customized to the specific needs of different customers, processes of knowledge creation may be particularly important (Hislop 2013, 55;Venkitachalam& Busch 2012, 358)

In the context of knowledge-intensive firms, the importance of social capital to knowledge workers is that it is only through having it that they are able to access the client specific knowledge that they require in order to be able to do their work effectively (Swart and Kinney 2003 in Hislop 2013, 78;Nahapiet&Ghoshal 1998, 244, 261).

The table 2 below shows how in a global study companies in different geographical areas manage human capital and what they consider most important. Top 3 concerns are globally rather similar except in the case of employee engagement. In that concern Europe seems to be in much better situation than Asia and USA in general because people are more engaged. On the other hand European workers seem to value companies that can offer learning opportunities.

Table 2. Strategies for managing human capital by importance (GTCI 2013, 71)

Global	Importance-adjusted strategies for managing human capital	Asia N=321	Europe N=85	United States N=95
1	Grow talent internally	1	1	1
2	Provide employee training and development	2	3	2
3	Raise employee engagement	3	T8	4
4	Improve performance management processes and accountability	7	T8	3
5	Increase efforts to retain critical talent	4	T5	9
6	Enhance effectiveness of the senior management team	8	11	8
7	Improve corporate brand and employee value propositions to attract talent	6	4	15
8	Hire more talent in the open market	9	7	6
9	Improve effectiveness of front-line supervisors and managers	5	16	10
10	Improve leadership development programmes	12	T12	7
11	Invest in education systems to improve workforce readiness	11	2	12
12	Improve succession planning for current and future needs	13	10	5
13	Redesign financial rewards and incentives	10	T12	13
14	Increase diversity and cross-cultural competencies	14	T5	T17
15	Promote and reward entrepreneurship and risk taking	15	15	11

Note: N=Number of overall responses. The response rate varies for each challenge. Each score represents the mean of the ranks given to the challenge. T=Tie.

Today's leaders must be master strategists, change managers, relationship/network builders, and talent developers to successfully utilize the strategies listed in Table 3 and meet their human capital needs.

Table 3. Key skills in areas of organizational importance (GTCI 2013, 72)

Global	#1 Human Capital	#2 Operational Excellence	#3 Innovation	#4 Customer Relationships	#5 Global Political/ Economic Risk
1	Grow talent internally	Raise employee engagement and productivity	Apply new technologies (product, process, information, etc.)	Enhance quality of products/services	Integrate long-term risk recognition into strategic planning
2	Provide employee training and development	Focus on reduction of baseline costs	Find, engage, and incentivise key talent for innovation (T2)	Sharpen understanding of customer/ client needs	Reduce exposure to risky countries/regions
3	Raise employee engagement	Break down internal silos	Engage in strategic alliances with customers, suppliers, and/or other business partners (T2)	Engage personally with key customers/ clients	Implement contingency plans for crises (e.g., geographical, political, relocation of employees)
4	Improve performance management processes and accountability	Continual improvement (six sigma, total quality, etc.)	Create culture of innovation by promoting and rewarding entrepreneurship and risk taking	Increase speed of products and services to market	Manage currency risk
5	Increase efforts to retain critical talent	Seek better alignment between strategy, objectives and organisational capabilities	Develop innovation skills for all employees	Use competitive intelligence to better understand customer/client needs	Establish crisis management teams and procedures

Tua Halldin-Herrgård proposes to enlarge the concept of tacit knowledge to be: Tacit knowledge is personal, but can be shared by individuals collectively, abstract but expressible in other forms than verbalization, affecting the ability to act independent of activity and competence and obtained by experience. (Haldin-Herrgård, 2004, 126)

According to Virtainlahti (2009, 76) these are the elements of managing tacit knowledge in figure XI below. To be able to realize this model you need to enable it with the active help of the supervisors and managers. To unleash the power of tacit knowledge in an organization the sharing of tacit knowledge must be managed differently from explicit knowledge. Many of the traditional methods of knowledge diffusion like manuals and lectures are unsuitable for tacit knowledge (Haldin-Herrgard 2000, 363).

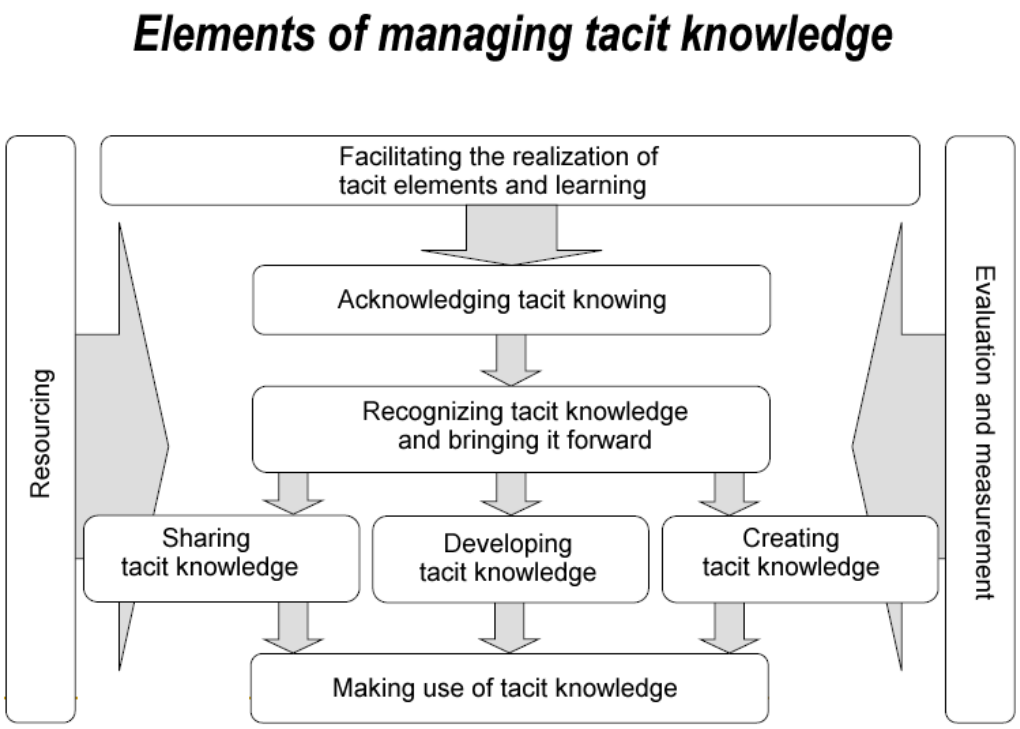

Fig. XI. Elements of managing tacit knowledge (Virtainlahti 2009, 76)

Tacit knowledge cannot be transferred as it is in scope and context of an individual but each person shapes his own tacit knowledge through the development of his own expertise and capability. It is most likely better to say that tacit knowledge is shared than transferred. In that case the knowledge is not transferred as it is to a less experienced worker but the expert facilitates the creation of tacit knowledge and development of capability of a junior worker.

As employees are the best experts of their own work, they have tacit knowledge-based feelings about the development needs. For instance, individual skills are important but do not guarantee organizational learning (Senge, 2006).

Tacit thought forms an indispensable part of all knowledge then the ideal of eliminating all personal elements would aim at the destruction of all knowledge (Polanyi 1966, 20). Act of knowing exercises a personal judgement in relating evidence to an external reality, an aspect of which he is seeking to apprehend (Polanyi 1966, 25).

Revisiting Polanyi clarifies his idea, that the tacit framework behind an expert's knowledge cannot be separated from the knowledge otherwise it will destroy the integrity of the knowledge itself. This should be taken into consideration when planning on what knowledge is to be made explicit and which has to be transferred in other ways. Even taking the idea further, transferring

tacit knowledge in this context is not even possible. Rather it will be creating the environment for the tacit knowledge holder to work with the apprentice in a way that creates a learning environment to allow tacit knowledge being created by the learner himself and overseen by the senior who can see further into the horizon. Sounds like action learning facilitated by mentoring.

Even in the case of a master and apprentice, the master is not directly transferring knowledge. Rather, the master helps the apprentice, or receiver, learn by shaping the way the apprentice takes information from the environment. (Thompson et. al. 2009, 328)

2.4.1 Barriers to generating and sharing tacit knowledge

In organizations where expertise is highly regarded, but mentoring and assisting others is not, rational people may be unlikely to surrender the power they gain from being an important knowledge source especially since sharing tacit knowledge requires time devoted to personal contact. (Leonard& Sensiper, 1998, 123)

Individuals possessing deep knowledge may also fear trying to express the inexpressible and failing. They may reason that no one can appreciate the experience they bring to this problem, therefore they will appear foolish and that is too high price to pay. (Leonard& Sensiper, 1998, 123)

Two forces drive transitions in knowledge management systems: (1) sustained low performance resulting from a lack of consistency among internal activities and (2) major changes in external competitive, technological, social and legal environment that render the existing knowledge management strategy ineffective (Nielsen& Michailova, 2007, 336)

Here are some observations of barriers that may exist in a company

- Not known how tacit knowledge was born
- Tacit knowledge is not recognized
- Not known how tacit knowledge can be elicited
- Not known hot tacit knowledge is transferred
- Not known what tacit knowledge transfer means
- Working routines do not support transfer of tacit knowledge
- Organizational culture does not support making tacit knowledge explicit
- Organizational culture on distributing knowledge
- No knowledge management culture
- Expert and newcomer have a hard time finding common language
- Sharing is not necessarily the problem but receiving
- Not enough time to share or internalize knowledge

- Tacit knowledge is not valued
- Weak IT skills
- Knowledge is hoarded and benefits of sharing is not realized
- No understanding of how to measure ROI
- No consistent planning on knowledge transfer from retirees

Another problem in this expert/novice relation is raised in finding the proper language to share expertise with novices. (Haldin-Herrgard 2000, 361)

Usually people seem to be unaware of the fact that they are embedded with some kind of tacit knowledge. This kind of knowledge is highly internalized and it is a natural part of human behaviour to be unconscious of knowledge which makes it difficult to reflect and share with others. (Haldin-Herrgard 2000, 361)

Although it is evident that matrix organization is the only way to function for this case Company Ltd, it may also be contributing to some of the problems of management. When the view on management culture is stuck on pyramid organization mode, I claim that decision making becomes vague and sometimes vagueness is even reinforced by a strong leader. The group dynamics that are needed for an efficient matrix organization are quite different from the ones in pyramid organization. This is also supported by findings of Chris Argyris (1999, 62)

The point about tacit knowledge is that it is always there: a company does not have to create it, but rather remove the barriers that surround it.

Virtainlahti and Moilanen have characterized junior and senior employees like this table 4 below. Obviously this is somewhat prejudiced and cannot be generalized but reveals the general attitudes towards junior and senior employees have to cope with and prove wrong or confirm. The characteristics of employees of different age contribute to the fact on how people are able to find common language and state of mind for the tacit knowledge transfer.

Table 4. Positive, negative and work-related characteristics of junior and senior employees (Virtainlahti& Moilanen 2005,116)

	Junior employees	**Senior employees**
Positive characteristics	• enthusiastic • active • inquisitive • unprejudiced • open-minded • fast • critical • initiative • energetic • persistent • easily adapt to new situations and change • eager to learn new things	• experienced • socially skilled • committed • considerate • responsible • determined • emotionally stable • correct • persistent • restful • perseverant • critical • diligent • farsighted • understand the whole
Negative characteristics	• restless • supercilious • know-it-all persons with unrealistic picture of their skills • have trouble in strategic thinking and understanding of particular situations	• slow pace • physically weaker • effects of aging
Work-related characteristics	• fresh knowledge from school • good IT skills • new ideas • accept routine tasks	• experience • professional skills and competence • positive influence on quality • tacit knowledge • lack of IT and language skills • lack of enthusiasm in

		developing things • resistant to change

2.5. Organizational learning

What usually happens in an organization when a new person enters it? The person receives a job description from his supervisor or recruiter. Orientation is typically on a general level to the practicalities. In the best case there is a support person to get him started. “You can always ask anyone” – but they are always busy. You are normally supposed to learn on your own and typically the predecessor has already left the company. You are expected to learn to manage well within 6 months and often you are spending your time learning what others already know and especially what your predecessor already knew. The importance placed on learning, knowledge management, and a knowledgeable workforce has become increasingly important regarding the advantages of operating as a learning organization. Scholars have for example drawn on philosophy to define knowledge, economists to discuss the role of knowledge in organizations, and psychologists to explain human interaction patterns.

A new employer adopts the norms of his workplace from the behavior, actions and speech but also through gestures and matters that are not done or said. (Adibe, Mäkelä, 2006, 4;Joe et. al. 2013, 916)

Orientation is very important also for transferring tacit knowledge (Kupias& Peltola 2009, 17–18;Virtainlahti 2009, 132)

The literature distinguishes between the learning organization and organizational learning. Easterby-Smith et al. (1999) describe organizational learning as the process of individual and collective learning that takes place within an organization, whereas the learning organization focuses on the methods and tools to evaluate and improve the quality of learning processes within an organization.

Learning has been researched a lot and there are different ways to look at learning. Individuals’ learning is researched more and there is quite a good consensus on what the term entails. You can look at it from performance based behavioural angle, process based cognitive angle or vision based humanistic view. Performance based theory looks into the action and results of learning. Process angle looks into how we gather, manage and process information. In this view the process is more important than the actor and his learning motivation. Humanism angle is probably the most difficult because you have to be able to separate organization from the individual. For an individual his motivation and basis for learning is taken into account in learning. For a learning organization or teams inside e.g. Peter Senge (Senge 1990, 9) states

that teams are in more important role in organizational learning than individuals because only the ability of teams to learn makes it possible for the organization to learn. This thesis will follow humanistic view having the viewpoint on how people learn together in working situations. In the table 5 below there are some schools of study for knowledge management and their contributors listed.

Table 5. School of study for knowledge management (Kirjavainen, Laakso-Manninen 2000, 12).

School of study and dominating research perspective	**Known developers of concept base**	**Focus, main contribution**
Knowledge management • Information Systems Science • business economics • philosophy of science, especially epistemology	• Nonaka, I. • Sveiby, K.E • Roos, J.& Roos, G. • Davenport, T.& Prusak, L. • Leonard-Barton. D.	Conceptualizing knowledge creation and refining process management and developing practices
Intellectual capital management • business economics • accounting	• Edvinsson, L& Malone,M.S. • Stewart, T.	Intangible asset modelling and techniques to measure and manage it
Competence based strategic management • Strategic Management • HRM	• Hamel,G .& Prahalad, C.K. • Stalk, G., Evans, Ph., • Schulman, L. et. al • Ulrich, D.& Lake, D.	Way to see corporate strategy and competition and how to connect personnel capabilities development into it.
Learning organization • psychology • educational sciences • organizational Theory	• Argyris, C.& Schön, D.A. • Senge, P.M.	Comprehensive organizational development philosophy where humans as organizational operators are seen more multidimensional

The most widely accepted definition for a learning organization was posited by Peter Senge: “Organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to learn together” (Senge 1990, 3).

Organizations learn only through individuals who learn. (Senge 1990, 139;Kim 1993, 37;Hayes& Allinson, 1998;Campbell& Armstrong 2013, 241;Dodgson 1993, 377) Individual learning does not guarantee organizational learning. But without it, no organisational learning occurs.

The learning of an organization starts on the level of the individuals when they reflect upon something that they have experienced. When the individual communicates this experience-

based knowledge internally within the organization, it becomes the basis for both individual and organizational learning (Argyris& Schön, 1996;Argyris, 1999).

Marquart says (Marquart 1999) that the traits of a learning organization are among other things

- Everyone in the organization are enabled to learn
- People in the organization understand the importance of learning for future success
- Learning is a continuous strategically important process
- Creativity and productivity is in focus
- Important and essential prerequisite is to use systemic thinking
- Organization is light and flexible
- People are embracing change and networking innovatively inside the company and out
- Everyone aims for quality and continuous improvement
- Action is described as eager, conversational, thinking and abstract

Fiol (1994) elaborates on the concept of organizational learning by examining the role of consensus and diversity, which have traditionally been regarded as mutually exclusive in the organizational learning process. By breaking the notion of consensus into two component parts, Fiol demonstrates how simultaneous agreement and disagreement is not only possible but also advantageous in organizational learning. For organizations, the implications of this are quite clear: managers must actively encourage the development of different and conflicting views of what is thought to be true, while striving for a shared view that is broad enough to envelop those differences. People may hold very different pictures of reality and still agree on the way they frame them. It is thus possible for groups to simultaneously agree and disagree, an essential component of collective learning.

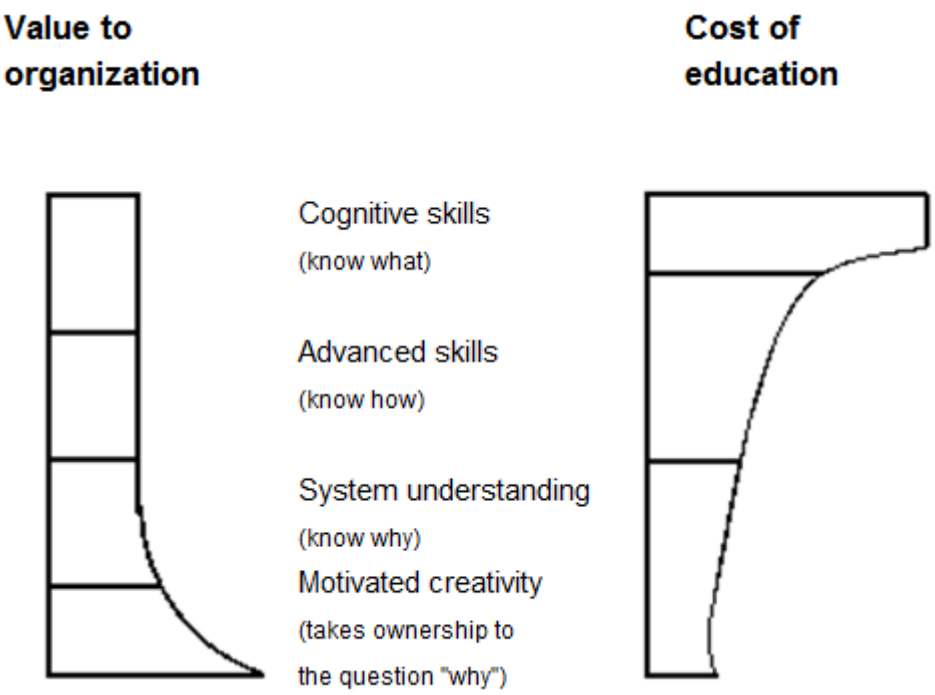

Fig. XII. The cost and value of education for a company (Adapted from Lankinen et. al. 2004,184)

The figure XII above describes how the value of certain skills through education meets with the costs of realizing it in an organizational setting. According to Lankinen (Lankinen et. al. 2004) systemic understanding and motivated creativity are the cheapest to adopt but create the most value to an organization.

The foreknowledge from 2013 Working Life Barometer published by Ministry of the employment and the economy of Finland 7.2.2014 describes working life quality development from employee perspective. The majority of 81% of employees have an impression that you can constantly learn new skills at work. More than half, 57% had participated in an employer-sponsored training last year. Shares have increased in the 2000s. The learning possibilities are, however, influenced by the employee's position and the business area of the company: the better educated tend to participate more in training than, for example, industrial workers. (Työelämä 2020, 2014)

2.5.1 Learning barriers and enablers

Learning in an organization is inhibited by defensive routines. They can be e.g. the way in which members of the organization use demeaning language in describing the company's activities. This prevents the problems from surfacing and leads to a false sense of infallibility. (Lämsä& Hautala 2004, 193)

One danger associated with creating homogenous groups of likeminded people is that sometimes they can develop an entrenched shared mental model that inhibits divergent and encourages stereotypic thinking. (Hayes& Allinson, 1998, 867)

Apparently a high level of expertise diversity and a low level of familiarity threaten the team learning processes sharing and co-construction (Van der Haar et. al. 2013, 8). On the other hand range of perspectives improves decision quality by ensuring that managers consider different sides of the issue.

Energy in organizations matters for performance, morale, innovation and learning (Cross et al., 2003).

One of the most extensively studied theories in social psychology is cognitive dissonance. It is an uncomfortable feeling when two contradictory ideas affect simultaneously. Senge (2006) proposes that dissonance has an effect that organization learns harmful defensive routines which prevent problem solving and organization learning.

Afterwards theorists have emphasized organizational culture, dialogue, leadership and work-life reconciliation. It can be said that a learning organization is aware of its capabilities and business opportunities that special capabilities give.

Connecting our knowledge workers purposefully gives a company a greater opportunity to create regular, sustainable business value (Pugh& Prusak 2013).

Capability and intangible asset management have become a part of strategic evaluation as resource management has been for years. In modern society, the economic importance of knowledge base and intangible assets has exceeded material capital, natural resources, and work force (Drucker, 1993).

Talent management is a natural step if you want to develop the organization into the direction of a learning organization. However it is not so easy to show the ROI on talent management in the day to day life of a company. You need to adopt a working process that supports learning and the have technical means to store knowledge in a usable form. When the advantages are hard to perceive and put into Euros it may be difficult to work towards a working process when performance management is the prevailing concept of working. In-process and end-process

impacts and measures are an important part of KM metrics. At Siemens, metrics for successful ROI include number of requests to the knowledge base, increase in orders, reusable R&D components, reduction in labour costs and reduction in production costs, lower training expenses and reduced IT investments. According to Agan (2014) learning has far and away the single greatest impact on revenue from new products. And creating a better environment for learning is what lean innovation does so well. Its focus on the most important product attributes and rapid cycling of trial and error - ideally in the real-life competitive environment - accumulates critical knowledge at a rapid rate.

- Companies with mandatory formal debriefs of both success and failure following new product launches average about 100% more revenue from new products in comparison to companies that do not formally debrief.
- When debriefs are led by an outside third party, the revenue increases substantially more.
- And when the learnings are captured in a knowledge management system, revenue jumps again.
- Companies that apply these learnings to creating, continuously improving, and strictly following decision-making criteria for the evaluation of potential new products average about 130% more revenue from new products. (Agan 2014)

But to maximize success, lean innovation must be married to practices that effectively capture these rich lessons and make them readily available to everyone within the organization. (Agan 2014)

Three knowledge intensive companies were analysed for learning difficulties by Kirjavainen and Laakso-Manninen (2000). The result was as per the table 6 below. On the right hand side column an evaluation was made (Korhonen, 2014) of the Company Ltd in a similar way. Grade is given on T=True, F=False, N=Neutral basis and if the case is borderline there is a parallel marking in parenthesis to show what direction the score is leaning towards.

Table 6. Learning difficulties analysis (Adapted from Kirjavainen, Laakso-Manninen 2000, 184).

	Structural and systemic reasons	Company Ltd
1	There are missing forums that unify organizational levels (vertical) ja and departments (horizontal) where exchange of experience would be natural and systematic	F
2	Nobody is concentrating on leading cooperation;administrative task oriented, non-integrative managerial posts	T
3	Sharing knowledge is not rewarded, teaching others might actually disadvantage oneself	N(T)

	Individual psychological and power politics related reasons	
4	One believes in the uniqueness of one`s inventions more than into accumulation of knowledge when sharing it	T
5	Knowing is valued more than asking the right questions	T
6	Management power is based more on knowing than sharing knowledge	N(F)
	Management practices reasons	
7	Common goal is missing or in the hands of few; understanding of what we are doing is fragmented	T
8	Decisions come from prepared opinions not so much from group discussions and processing together	T(N)
9	Design and goal definition comes from the top almost exclusively and it does not involve or encourage collaboration between the silos	T(N)

Summary of the case Company Ltd evaluation in the table above is that points 4, 8 and 9 could be improved by better socialization in the organization to have a more diverse input in decision making. Points 2 and 7 are more management and leadership issues and should be reflected on and improved. Item 5 is clearly an organizational culture driven factor and requires deeply rooted attitudes to be transformed.

Different cooperation meetings, work situation evaluations and dealing with problematic situations in a group offer an excellent opportunity to build organizational knowledge and share already existing knowledge. (Moilanen et. al 2005, 23;Davenport& Prusak 1998;Van der Haar et. al. 2013, 8)

Codify the lessons learned. It's important that someone in the organization have an overall view of the initiative;otherwise valuable learning could easily be lost. (Staats& Upton, 2011) Edmondson (Edmondson et. al. 2001, 11) found that teams learn more quickly if they are explicitly managed for learning and Kreiner (Kreiner 2002, 122) states that: "tacit knowledge needs to be managed in tacit ways".

Companies must capture the knowledge of internal and external specialists so that others in the organization can benefit from it. This requires robust, easy-to-use knowledge management processes and systems. Some companies categorize each project up front according to the insights it is likely to generate (for example, "distinctive," "proprietary," or "common") and create a road map for how insights should be documented and shared. The road map specifies templates for codifying knowledge, lists of people and groups within the company who might find the knowledge useful, and suggested schedules for knowledge-transfer meetings. (Dewhurst, Hancock, Ellsworth 2013)

Some types of knowledge (e.g., explicit) may be easily codified and transferred in a large group setting (e.g., through meetings), whereas other types of knowledge (e.g. tacit) require intense interaction and are likely to be successfully transferred only in a small group setting at the specific location where the knowledge is used. (Dyer& Nobeoka 2000, 348) Different methods like apprenticeship, direct interaction, networking and action learning that include face-to-face social interaction and practical experiences are more suitable for supporting the sharing of tacit knowledge. (Haldin-Herrgard 2000, 359;Virtainlahti& Moilanen 2005, 117;Badaracco 1991;Hamel 1991)

Knowledge that is easy to codify in firms

- Development ideas
- Contact information of customers and suppliers
- Competitor analysis
- Customer relationship
- Market business intelligence
- Processes and procedures
- Project plans and instructions
- Manufacturing processes
- Product data (drawings, datasheets)

For knowledge to be transferred effectively according to Thompson et. al (2009, 327) it must be:

- Accessible. The knowledge (embedded information) which is to be transferred must be accessible to the individual who is to receive it.
- Understandable. The individual must understand the embedded information.
- Relevant. The individual must see the relevance of the embedded information to his/her particular life or current situation.
- Desired. The individual must want to accept and use the embedded information.
- Usable. The individual must engage the embedded information in order to make it his/her own knowledge.
- Repeatable. The individual must repeatedly use the knowledge created by the act of engagement.

Thompson et. al (2009, 331;338) wisely propose a model of knowledge transfer that focuses on the interplay between embedded information and engagement – between the sender and receiver, between knowledge as stock and knowledge as process. The focus should be also on if the receiver sees the information as relevant, if he wants to and can actively do something with the information and can he repeat the actions.

An organization can manage and make a profit by focusing on trust, or the impact made by the lack of it. It is clear though that the organization releases intellectual capital resources and even time for the core activities at work and core knowledge if the trust is strong in the organization. Through trust organization gains a competitive advantage in relation to other comparable organizations. (adapted from Adibe& Mäkelä, 2006, 10) Many authors believe that when there are trust-relationships, people are more willing to provide useful knowledge. Also, when trust exists, people are more willing to listen and absorb each other's knowledge (Bakker et. al. 2006, 598) Trust also is involved in decisions affecting transfer and use of tacit knowledge (Holste, Fields 2009). Some studies have suggested that junior workers are more individualistic and less trusting of others than older workers. This suggests that age might affect a worker's willingness to share or use tacit knowledge. (Holste& Fields 2009, 133) According to Nonaka et. al. (1995) building trust requires the use of face-to-face dialogue that provides reassurance about points of doubt and leads to willingness to respect the others sincerity.

Trust is likely to have most effect on knowledge sharing as a result of its absence rather than due to its presence. Trust may be a condition to knowledge sharing, but does not have a positive effect on the sharing of knowledge per se: although the absence of trust may impede people's motivation to share knowledge with others, it is unlikely that those who have high levels of trust in others are more likely to share knowledge than those with moderate trust levels. (Bakker et. al. 2006, 598)

2.5.2 What should firms do about organizational learning

One popular approach to understanding competitive dynamics is the resource-based view of the firm. According to this view, the explanation for why some firms ultimately succeed and others fail can be found in understanding their resources and capabilities. In some business areas, the intangible asset managing is the most important issue in creating competitive advantage (Porter, 1985;Haldin-Herrgard, Tua 2000, 357).

Drucker knows several German companies that follow the baseball-team model, whether they know it or not. Their strength is clear: they are fantastic at exploiting and developing old knowledge, and Germany's midsize companies may be better than the big ones simply because they concentrate better. (Drucker 1993, 121)

The lesson is that the productivity of knowledge has both a qualitative and a quantitative dimension. Though we know very little about it, we do realize executives must be both managers of specialists and synthesizers of different fields of knowledge – really of knowledges, plural. (Drucker 1993, 122)

Although knowledge should impact organizational performance positively, there is evidence that suggests that something is lacking. What Bierly believes is lacking is an explicit link between strategic choices and the application of organizational knowledge. There needs to be a shift from a focus of maximizing efficiency or one's knowledge base to a central concern with making difficult (strategic) decisions that involve trade-offs concerning products, markets and technologies. Ideally, this focus should also extend to the social and environmental issues surrounding organizations. Bierly will argue that this is not a function of maximizing knowledge as currently being discussed, but the selection of what kind of knowledge to select, apply, and institutionalize in the firm. (Bierly et al. 2000, 596)

Thus, success does not necessarily go to the firms that know the most, but to the firms that can make the best use of what they know and know what is strategically most important to the firm and to the society at large. (Bierly et al. 2000, 596;Thompson et. al. 2009, 331) Being a learning organization is not enough; a company must also be capable of learning more efficiently than its competitors (Hamel& Prahalad 1993, 80;Cunningham 1994, 21;Stonehouse& Pemberton 1999, 133).

The judgement, selection and use of specific knowledge for a specific context is what Bierly terms organizational wisdom. That is, wisdom relates to the ability to effectively choose and apply the appropriate knowledge in a given situation. Bierly further argues that organizational wisdom involves the collection, transference and integration of individuals' wisdom and the use of institutional and social processes (e.g. structure, culture, routines) for storage. (Bierly et al. 2000, 597)

Practical wisdom, according to the studies of Nonaka and Takeuchi, is experiential knowledge that enables people to make ethically sound judgments. Practical wisdom enables leaders to see the essence and intuitively fathom the nature and meaning of people, things, and events. Wise leaders constantly create opportunities for senior executives and employees to learn from one another. Wise leaders exercise political judgment by understanding the viewpoints and emotions of others, gleaned through everyday verbal and nonverbal communication. Fostering distributed leadership is one of the wise leader’s biggest responsibilities. (Nonaka& Takeuchi 2011)

Bierly (2000) argues that individual wisdom is transformed into organizational wisdom through several means, three of the most important being:

- transformational leadership;
- organizational culture and structure;and
- knowledge transfer. (Bierly et al. 2000, 609)

The very processes of knowledge transfer and organizational learning provide a fundamental mechanism for the development of organizational wisdom. Simply put, organizational wisdom can be enabled through an effective organizational communication system that encourages learning. (Bierly et al. 2000, 612)

Additionally, wisdom must be transferred throughout the organization. This will not happen unless the concept of organizational wisdom is understood and valued throughout the organization and organizational leadership, culture and structure are specifically focused toward facilitating its development and transfer. (Bierly et al. 2000, 612) According to Alan Kransdorff (1998) organizational memory only very distantly has something to do with the specific skills of the employees. It is more related to the routines when routines are understood as wide ranging practices. (Kransdorff 1998, 3)

Organizational culture is seen to comprise of relatively stable congruent values, beliefs, customs, traditions, and practices that a new member that joins the organization learns and are transmitted to the new generations. (Jussi Onnismaa in Toom et. al. 2008, 120)

In a research Ian Cunningham (Cunningham 1994, 13-15) found that organizations can be divided into 5 categories regarding how supportive the company's management were to individual learning. Apathetic and antagonist organizations had an attitude that taking part in training and development is a waste of time. In reactive companies management was supportive of learning but on reactive basis so that if management was pushed for a funding for external course people might get funding for it. However there was no strategic imperative guiding learning nor was there any attempt to evaluate courses taken or other development activity. Bureaucratic companies had a budget and ran internal or external courses. Training was based on questionnaires on needs and average of the whole company. Strategic companies were a minority. There learning was committed to on management board level. Senior personnel was respected and called upon for mentoring and counselling. In taking strategic approach these organizations would look for a direct linkage between business needs and learning activity.

Organizations forget, unlearn, and lose knowledge in a number of ways and under many circumstances. Organizational oversight can be described as the loss of organizational knowledge on purpose or unintentionally that leads to permanent changes in the way the organization operates. (Jussi Onnismaa in Toom et. al. 2008, 124)

The only way for an organization to be successful is that it is always able to find new perspectives. To find new perspectives there has to be sufficient successful dialogue between all people. Learning organization is not born and experiences are not transferred in just any kind of dialogue. A good dialogue seeks common understanding and harmony. This requires that the

parties in the discussion aim to take each other's floor as such and understand their meaning. (Pauli Juuti in Toom et. al. 2008, 231)

Once individual mental models have become sufficiently spread throughout the organization by a complex array of formal and informal means, change in the resultant shared mental models can be said to represent the organization's learning. (Kim, 1993;Senge, 1990;Hayes& Allinson, 1998)

In many organizations, people come up with a situation where the need for continuous learning comes from the company objectives. The company gains if you do this or that and learn. Well not all employees are really motivated by that. They do not really care about strategic alignment, changes in competition, success factors or goals for economic performance such as EBIT. Some people understand the link between learning and strategic goals but most people don`t or at least they are not looking at it from company angle but more from individual personal angle. Here is where you enter organizational psychology and you have to figure out what motivates people. The key element in managing change such as the way we are learning in a group setting is that everybody benefits somehow or at least your situation does not get worse by the change. Everyone needs a motivation. Motivators for learning must be aligned by the student and goals for learning must be aligned by the organization. The hardest aspect about organizational learning is that people have to have their own experiences to really understand it. Organizational learning differs from individual and team learning as organizational learning occurs through shared revelations, knowledge and reflection process that the organization has. This process is dependent on earlier experience and knowledge i.e. the organizational memory that is rooted in the organizational processes, procedures, routines and actions.

2.5.3 Knowledge assets in a company

Organizational knowledge consists of dispersed capabilities that must be brought together by structures (meetings, processes) and especially by leadership. Based on the knowledge vision of the company, top management has to facilitate dynamic knowledge creation by taking a leading role in managing the three elements of the knowledge creating process (Nonaka et. al 2000, 24).

Sanna Virtainlahti states that

- the organization must know what capabilities they have
- the organization must know who has it
- the organization must identify the potential of that knowledge (Virtainlahti 2009, 74).

Nonaka, Toyama and Konno (2000) have divided knowledge assets into four types that they name: Experiential knowledge assets, conceptual knowledge assets, systemic knowledge assets and routine knowledge assets. In the figure XXIII below there is a short description of each through a company`s knowledge asset examples

Experiential Knowledge Assets	**Conceptual Knowledge Assets**
Tacit knowledge shared through common experiences • Skills and know-how of individuals • Care, love, trust, and security • Energy, passion, and tension	Explicit knowledge articulated through images, symbols, and language • Product concepts • Design • Brand equity
Routine Knowledge Assets	**Systemic Knowledge Assets**
Tacit knowledge routinised and embedded in actions and practices • Know-how in daily operations • Organisational routines • Organisational culture	Systemised and packaged explicit knowledge • Documents, specifications, manuals • Database • Patents and licenses

Fig. XIII. Four categories of knowledge assets (Nonaka et. al 2000, 20)

Experiential knowledge assets

Experiential knowledge assets consist of the shared tacit knowledge that is built through shared hands-on experience amongst the members of the organization, and between the members of the organization and its customers, suppliers and affiliated firms. Other examples of emotional knowledge are care, love and trust, physical knowledge such as facial expressions and gestures, energetic knowledge such as senses of existence, enthusiasm and tension, and rhythmic knowledge such as improvisation and entrainment.

Conceptual knowledge assets

Conceptual knowledge assets consist of explicit knowledge articulated through images, symbols and language. They are the assets based on the concepts held by customers and members of the organization. Brand equity, concepts or designs are examples of conceptual knowledge assets. Since they have tangible forms, conceptual knowledge assets are easier to grasp than experiential knowledge assets. It is still not easy to know how customers experience them.

Systemic knowledge assets

Systemic knowledge assets consist of systematized and packaged explicit knowledge, such as explicitly stated technologies, product specifications, manuals, and documented and packaged information about customers and suppliers. Legally protected intellectual properties such as licenses and patents also fall into this category. A characteristic of systemic knowledge assets is that they can be transferred relatively easily. This is the most `visible' type of knowledge asset, and current knowledge management focuses primarily on managing systemic knowledge assets, such as intellectual property rights.

Routine knowledge assets

Routine knowledge assets consist of the tacit knowledge that is routinized and embedded in the actions and practices of the organization. Know-how, organizational culture and organizational routines for carrying out the day-to-day business of the organization are examples of routine knowledge assets. Through continuous exercises, certain patterns of thinking and action are reinforced and shared amongst organizational members. Sharing the background to and stories about the company also helps members to form routine knowledge. A characteristic of routine knowledge assets is that they are practical.

2.5.4 Technical tools to organizational learning

In this chapter there is a short introduction on the tools and processes available for knowledge management. It is not complete but gives a platform to build discussions on if a KM initiative should be considered. Having been working to help build an infrastructure that embeds reflection and learning in the day-to-day work processes and uses a knowledge system to support the infrastructure and share the learnings Finerty (1997) has found that:

- the learning infrastructure is adding value to the organization along many dimensions.
- quality conversation and reflection are key to on-going learning.
- knowledge systems can support the establishment and effectiveness of learning infrastructures.
- the establishment of communities sharing a common purpose provides the bedrock or foundation for effective learning in an organization. (Finerty 1997, 98)

In the figure XIV below Junnakar& Levers illustrate the components needed for a knowledge management project. In an important role are the aspects of how people learn and interact.

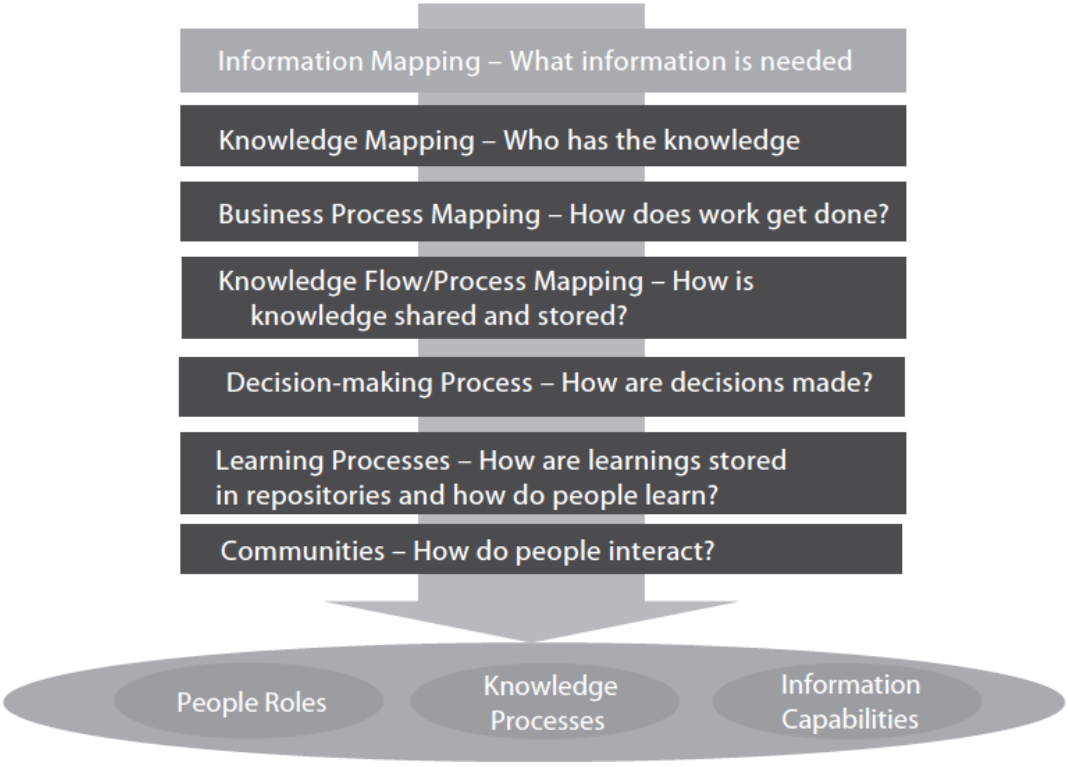

Fig. XIV. Knowledge management project components (Junnarkar& Levers, 2005)

An interesting categorization of KM technologies is provided by Binney (2001, 38). In this mapping in the developmental stage of the spectrum, a number of knowledge management applications are recognized as being of critical importance, and some enabling technologies are depicted in the Table 7 below. (Lytras& Pouloudi 2006, 73)

Table 7. Enabling technologies mapped to the KM spectrum, (Lytras& Pouloudi 2006, 73)

	Transactional	Analytical	Asset Management	Process	Developmental	Innovation and Creation
Knowledge Management Applications	▪ Case-Based Reasoning (CBR) ▪ Help Desk Applications ▪ Customer Service Applications ▪ Order Entry Applications ▪ Service Agent Support Applications	▪ Data Warehousing ▪ Data Mining ▪ Business Intelligence ▪ Management Information Systems ▪ Decision Support Systems ▪ Customer Relationship Management (CRM) ▪ *Competitive Intelligence*	▪ Intellectual Property ▪ Document Management ▪ Knowledge Valuation ▪ Knowledge Repositories ▪ *Content Management*	▪ TQM ▪ Benchmarking ▪ Best practices ▪ Quality Management ▪ Business Process (Re)Engineering ▪ Process Improvement ▪ Process Automation ▪ Lessons Learned ▪ Methodology ▪ *SEI/CMM, ISO9XXX, Six Sigma*	▪ Skills Development ▪ Staff Competencies ▪ Learning ▪ Teaching ▪ Training	▪ Communities ▪ Collaboration ▪ Discussion Forums ▪ Networking ▪ Virtual teams ▪ Research and Development ▪ *Multi-disciplined Teams*
Enabling Technologies	▪ Expert Systems ▪ Cognitive Technologies ▪ Semantic Networks ▪ Rule-based Expert Systems ▪ Probability Networks ▪ Rule Induction, Decision Trees ▪ *Geospatial Information Systems*	▪ Intelligent Agents ▪ Web Crawlers ▪ Relational and Object DBMS ▪ Neural Computing ▪ Push Technologies ▪ Data Analysis and Reporting Tools	▪ Document Management Tools ▪ Search Engines ▪ Knowledge Maps ▪ Library Systems	▪ Workflow Management ▪ Process Modeling Tools	▪ Computer-based Training ▪ Online Training	▪ Groupware ▪ e-Mail ▪ Chat Rooms ▪ Video Conferencing ▪ Search Engines ▪ Voice Mail ▪ Bulletin Boards ▪ Push Technologies ▪ Simulation Technologies
	▪ Portals, Internet, Intranets, Extranets					

In each of the 16 cells of the table 8 below, specific IT applications are depicted, according to their capacity to promote the main scope of knowledge management. The propositions of the model describe in synopsis the underlying logic that is summarized by the knowledge management and learning convergence. This framework guides business managers as well as academics in the way that it correlates IT applications to specific knowledge and learning dynamic flows. (Lytras& Pouloudi 2006, 77)

Table 8. A proposed framework for knowledge management support from a learning perspective (Lytras& Pouloudi 2006, 77)

		Locus of Knowledge			
		ARTIFACT	INDIVIDUAL	TEAM	ORGANIZATION
KNOWLEDGE Level of A – Priori Structure	STRUCTURED	1. Documents Repository Data Warehousing	2. Yellow Pages of Experts Expertise Profiles & Databases	3. Work Flow Systems Collaborative Work Systems Project Deliverables Repository Team Profiles	4. Enterprise Application Integration Best Practices, FAQS Knowledge Maps Knowledge Brokers OLAP
	UNSTRUCTURED	5. Collaborative Filtering Intranets & Search Engine	6. Electronic Discussion Forums	7. Virtual Teams Group Ware Systems Chat/Conferencing List Servers E-mail	8. Teleconference Intranets Extranets CRM Search Engines Data Mining Help Desk Applications
LEARNING CONTENT	STRUCTURED	9. Learning Objects Base Learning Templates Base Metadata Mgmt system Learning Scenarios Builder	10. Semantics Competences Description Learning Expertise Profiles	11. Expert Systems for Personalization Lessons Learned FAQS	12. Profiling System Lessons Learned Programs FAQS Learning Infrastructure
	UNSTRUCTURED	13. Search Engine Keywords Extract	14. Annotations Needs Assessment Tool Motivation System Evaluation System	15. Role Playing Games Business Simulation Brainstorming	16. Benchmarking Business Intelligence

Based on observations in the case Company Ltd and the conducted interviews it is apparent that KM on the level of the theoretical framework is not being applied. It is relatively easy to propose some improvement points regarding the process aspects and the tooling that could bring benefits through controlled knowledge management initiatives. Especially it was pointed out through all the disciplines and experience levels that managing the plethora of documents is not especially well done and there are some challenges in knowing where to find the piece of information or knowledge needed.

2.5.5 Social tools to organizational learning

There is much more to knowledge management than technology alone. Knowledge management is a business process (Sarvary, 1999, 95) It includes three sub-processes: organizational learning where company acquires knowledge, knowledge production where

company integrates raw information into knowledge and knowledge distribution where company allows members of the organization to leverage the knowledge (adapted from Sarvary, 1999, 96) If you look at some of the learning models learning comes from internalizing new knowledge and experimenting and reflecting on it. In Kolb`s learning model (1984) learners need to have an open mind to engage, reflect and observe and implement the theory on a practical problem. In Engeström`s the theory is from beginning related to group learning and includes reflection of the process. In a loose way this is in line with action learning and Nonaka and Takeuchi`s learning cycle and their statement where “Organizational knowledge creation should be understood as a process the organizationally amplifies the knowledge created by individuals and crystallizes it as a part of the knowledge network of the organization “(Nonaka and Takeuchi 1995, 59). Knowledge processes such as sharing seem to be social in nature.

There is considerable precedence for considering knowledge as a process versus an outcome. As Kolb (1984) forwards in his theory of experiential learning, knowledge retrieval, creation and application requires engaging knowledge as a process, not a product.

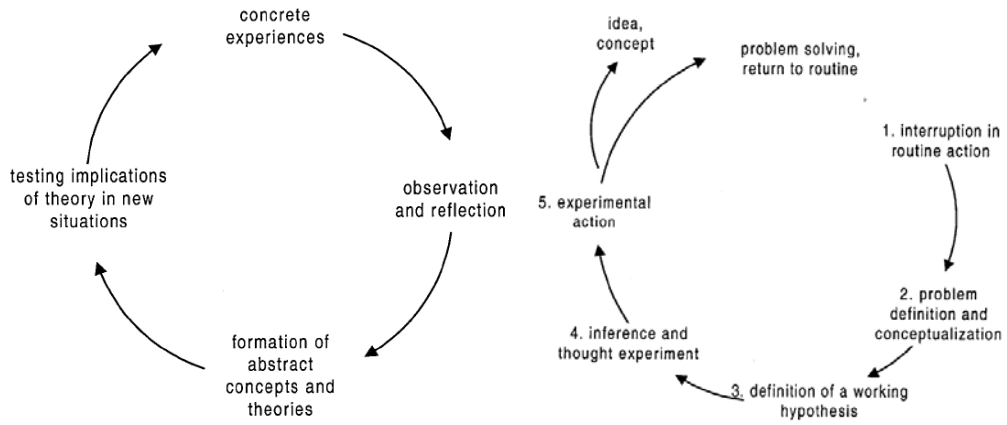

Fig. XV. Kolb`s learning model and Engeström`s learning cycle (drawings from Tuomi 1999, 308; 311 respectively)

The figures XV above are of single loop learning. Problem solving is an example of single loop learning. You identify an error and apply a particular remedy to correct it. But genuine learning involves an extra step, in which you reflect on your assumptions and test the validity of your hypotheses. Achieving this double-loop learning is more than a matter of motivation—you have to reflect on the way you think.

In Figure XVI below, the person, the team and the organization define dynamic flows that are of critical importance in knowledge-intensive organizations. Learning and knowledge flow link together person(s) and the organization as well as team(s) and the organization. Of course, team-to-team linkages can be defined as well as person-to-person relationships (for simplicity, these are not depicted in Figure XVI). These patterns of relationships imply specific scenarios of knowledge exploitation. (Lytras& Pouloudi 2006, 69)

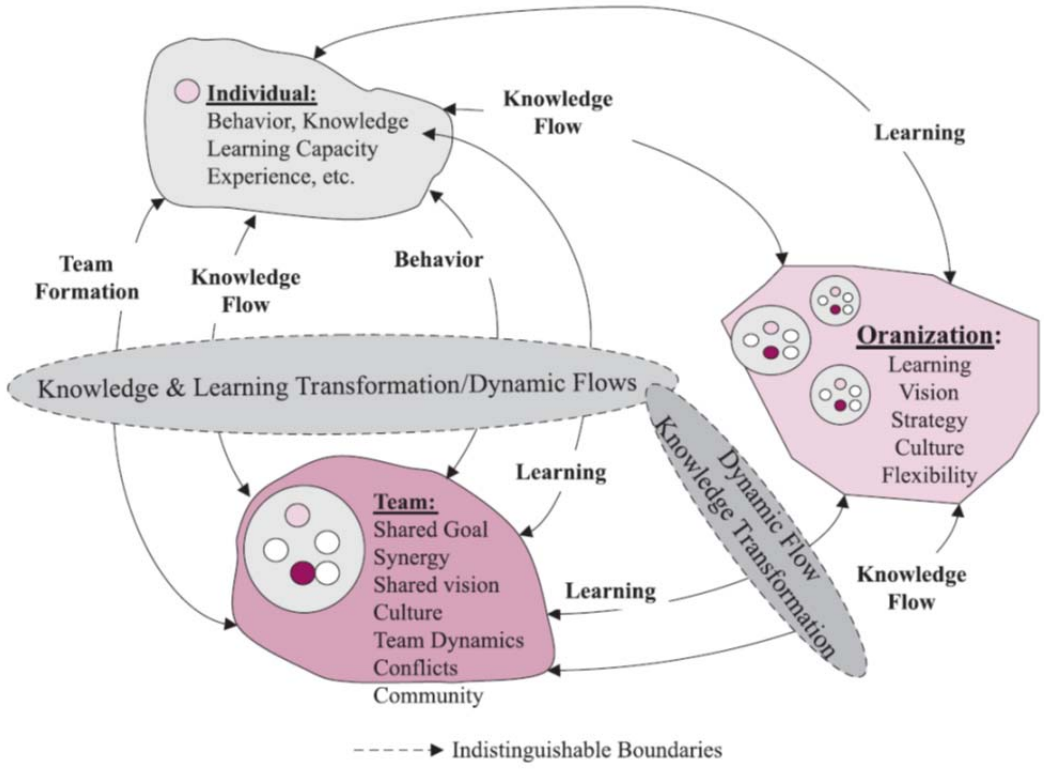

Fig. XVI. The knowledge management intra-organizational landscape (Lytras& Pouloudi 2006, 69)

To be effective in today's working life, knowledge workers need to manage three kinds of knowledge; their own tacit knowledge, their interaction with the information available in explicit form, and their interactions with other knowledge workers to tap the knowledge implicit in conversations and communities. The skills to do this effectively more or categorizes into two parts: information skills and social skills.

Knowledge management is not seen as a matter of building a large electronic library but by connecting people so they can think together (McDermott, 1999, 104;Pugh& Prusak 2013)

Learning and development is built upon how individuals internalize and apply what they learn based on how they acquire the knowledge. Lombardo and Eichinger (1996) rely on the 70/20/10 formula that describes how learning occurs:

- 70% from real life and on-the-job experiences, tasks and problem solving. This is the most important aspect of any learning and development plan.
- 20% from feedback and from observing and working with role models.
- 10% from formal training.

Leadership that reinforces learning

- Managers recognize the limits of their knowledge and invite input from others
- Managers ask questions and listen effectively
- Managers encourage expression of multiple viewpoints
- Managers provide time and resources for identifying problems, analyzing performance and reflecting on new ideas

Technology is likely to play a strong role in the management of explicit knowledge, while its role in managing tacit knowledge will lie in facilitating interpersonal knowledge transfer. Some research says the greatest organizational KM potential is in leveraging tacit knowledge. Other research says that tacit knowledge sharing is accomplished through social exchanges or people networking. Perhaps tacit knowledge is the more important component of KM, to the extent that the collaboration that it encourages leads to quantum shifts in knowledge rather than the incremental linear enhancements that are typically associated with explicit KM (Harlow 2008,160). Knowledge sharing enhances learning and performance and requires a connection between people (Hedlund 1994;Myers 1996;Kyndt et. al. 2013).

In the figure XVII below Nevis (Nevis et. al. 1995, 82) describe elements of an organization as a learning system by attaching it factors and orientations that would facilitate learning and help companies select areas for learning improvement that do not require drastic culture change but can lead to incremental change over time.

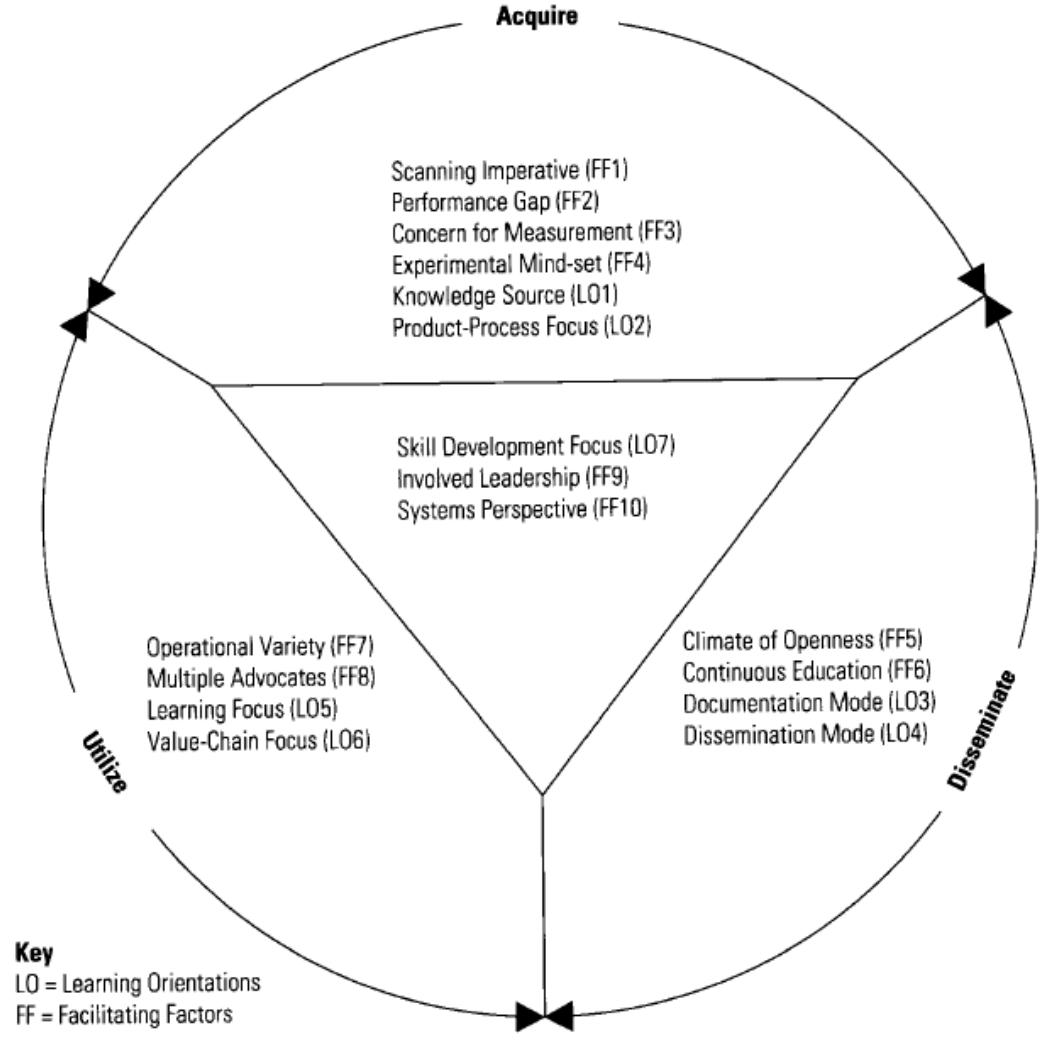

Fig. XVII. Elements of an organizational learning system (Nevis et. al. 1995, 82)

Seven learning orientations (LO) include preference for developing knowledge internally (LO1), emphasis on accumulation of knowledge about what products are versus on how to make them (LO2), knowledge is something an individual possesses (LO3), formal methods for sharing knowledge (LO4), incremental learning rather than transformative (LO5), emphasis on investments in engineering rather than sales activities (LO6) and development of individuals versus group skills (LO7).

The ten facilitating factors (FF) to the success are scanning imperative of the business environment (FF1), realizing the performance gap as an opportunity for learning (FF2), concern for measurement as metrics of learning when venturing for new business (FF3), experimental mind-set trying new things (FF4), climate of openness in access to information and communication (FF5), continuous education at all levels of organization (FF6), operation variety in methods and appreciation of diversity (FF7), multiple advocates as in more than one

champion (FF8), involved leadership that articulates vision, is engaged in its implementation and interacts with the members (FF9) and systems perspective that sees solutions in terms of systemic relationships among processes (FF10).

Within the model there are two general directions for enhancing organizational learning. One is to embrace the existing style and improve its effectiveness. Second is to change learning orientations. When starting to improve its learning capabilities a company can start from any of the cycles depending which one needs most efforts. (Nevis et. al. 1995, 83-84)

2.6. Weak signals

Weak signals as a term have many explanations and definitions. Strategy guru Igor Ansoff defined his in the 1970`s so that weak signals are “company internal or external warning signs, events or developments that are too weak so that their impact could be evaluated”. Similarly, Schoemaker and Day (2009) see a weak signal as ‘‘a seemingly random or disconnected piece of information that at first appears to be background noise but can be recognized as part of a significant pattern by viewing it through a different frame or connecting it with other pieces of information’’.

Bryan Coffman (1997) defined it like this: In organizational dynamics a weak signal is

- an idea or trend that will affect how we do business, what business we do, and the environment in which we will work
- new and surprising from the signal receiver's vantage point (although others may already perceive it)
- sometimes difficult to track down amid other noise and signals
- a threat or opportunity to your organization
- often scoffed at by people who "know"
- usually has a substantial lag time before it will mature and become mainstream
- represents an opportunity to learn, grow and evolve. (Coffman, 1997)

Weak signals have also been defined as the early warning indicators, emerging issues or wildcards. Weak signal and the wild card, are not synonymous, although they are sometimes used as such. Wild card is a rare and unlikely event when occurs has significant impact in technology or economy. Wild card has a synonym in literature as Black swan (Taleb, 2007).

A weak signal is a tentative relationship between phenomena that claim attention and the impact of such phenomena on the survival of the firm. More precisely weak signals are perceptions of possible changes that are essentially candidates within a socially relevant and

resonant knowledge building process, that in all cases need to be: (1) conjugated with other weak or strong signal candidates and iteratively matched against change models (a scenario minded step), (2) confronted to one's own bias-producing capabilities, (3) interacted upon with others stakeholders, hopefully involving a diversity of viewpoints, and (4) followed-up and evaluated in light of actual developments, with constant early sensitivity regarding strategic options. (Rossel 2012, 236)

Weak signals in terms of future studies and foresight are widely researched. The angle in this thesis is more the weak signals from the customer interface than "the markets" i.e. the end user base.

Weak signals are problematic in terms of methodology. There seems to be no pattern or at least no historical reference you could apply a pattern to. That makes them unique in nature and non-recurring Therefore it is not likely that you could use weak signals in forecasting the futures based on a pattern. You need an experienced expert that has a lot of reference material in his head to act as reflective surface against the signal and evaluate the emerging issues case by case.

It is said that expert knowledge does not automatically lead to the ability to recognize weak signals. That is painfully evident in the recent case Nokia and their loss of the competitive edge. Experts no doubt have the best knowledge of what is being developed and studied at the moment but not necessarily what is happening in the neighbouring "laboratory". Experts tend to present lame, cautious and uninteresting phenomenon as weak signals (Mannermaa 2004, 118).

There is a difference between active and passive scanning. All managers scan, but they often do so passively. They keep their antennae up and wait to receive outside signals. They are continually exposed to a wealth of data ranging from the fuzzy impression of trade rumours to harder evidence from sales reports, trend studies, and technology forecasts. Managers monitor key performance indicators and other metrics for assessing accountability, maintaining control, and guiding Six Sigma initiatives. Although managers using this passive approach may feel in tune with the periphery, this may be a delusion. Because most of the data comes from familiar or traditional sources, this mode of scanning tends to reinforce, rather than challenge prevailing beliefs. Active scanning reflects intense curiosity and emphasizes the further-out and fuzzier edge of the periphery. (Day& Schoemaker 2006;Kaivo-oja Jari 2012, 210)

Different areas of the periphery, as shown in Figure XVIII, require different scanning approaches. Some have characteristics of competitive intelligence, technology forecasting, and market research. Others draw on new technologies for searching the Web or for achieving deeper insights into consumers through metaphor elicitation, lead-user analysis, trend tracking, and other approaches.

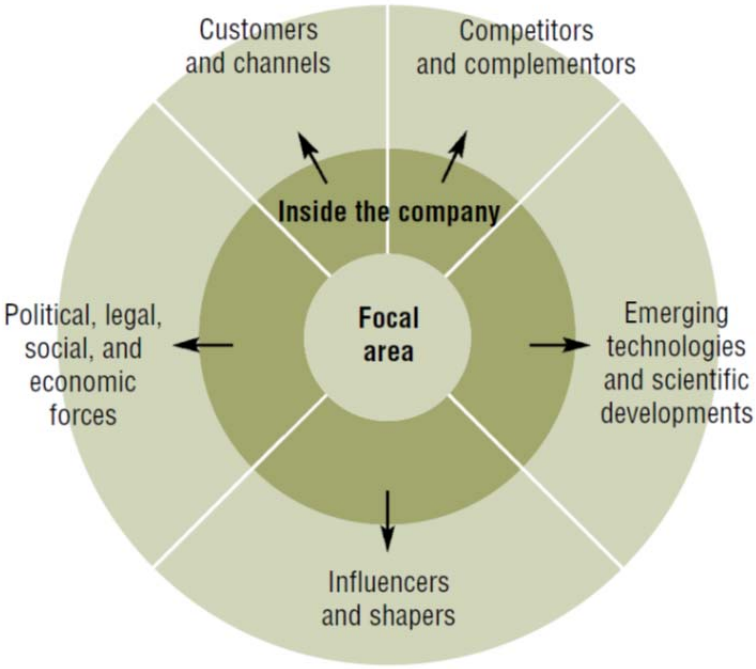

Fig. XVIII. Capturing weak signals from the periphery (Day, Schoemaker 2006)

So how does this link to organizational learning? Effective scanning is an active learning process that is:

- guided by “good” questions
- using triangulation to reveal the meaning of ambiguous signals
- flexibility requires a portfolio of strategic options

In a rapidly changing environment the biggest competitive threat is the steady pace of competence-destroying change that occurs, combined with the inability of management to foresee these changes. (D’Aveni 1994;Eisenhardt& Brown 1998;Brown& Eisenhart 1998).

To navigate turbulent business environments, organizations have to develop foresight capacities that enable them to anticipate probable futures, respond rapidly to emerging changes, and support future oriented action. (Graefe, Luckner, Weinhardt 2010, 394)

The traditional linear strategic planning methods (Ansoff 1984;Minzberg& Lampel 1999) are concentrating on an efficient, well-focused strategic plan with a clearly defined vision, mission and strategy statements. The side effect of this may be that a strong strategy process is reducing the peripheral view for surprising shifts in the business environment. In order to avoid

strategic surprises the strategy process should be able to open the scope of observation for periphery incidents and early warning signs.

The methods of environment-monitoring and their implementation scope will determine (Ansoff 1979), which observations and weak signals are taken into more intensive consideration, which are filtered out, and which issues eventually find their way into the vision statement of an organization.

Weak signal is by the definition unstructured information and its implications to the organization are at an early stage very hard to define. Weak signal represents a potential discontinuity, something that the organization has not interpreted before. To have an impact on the mental model, to change it the signal needs to be amplified

When the weak signal is new and it is inconsistent with the manager's past experience it is easily rejected as inaccurate or irrelevant. Weak signals that do not fit are often ignored, distorted or dismissed, leaving the company exposed (Schoemaker& Day 2009, 88).

Harris and Zeisler (Harris& Zeisler 2002, 25): ''Weak signals are weak because they are easily blurred by other factors, including current mind-sets, attitudes, and biases of those involved in the search for the future''. A typology of biases, including ways of circumventing them, has been initiated by Schoemaker and Day (Schoemaker& Day 2009, 82-83).

For instance when it comes to social dynamics and changes in social dynamics the detection of weak signals is influenced by factors like the social status of interpreters, the multiplicity of points of view or power relations that often reflect hidden or tacit paradigmatic attractors. (Rossel 2012, 235)

If the observation unit is a manager, the limits of this filter will be set by the manager's prior experiences, personal strategic maturity and his personality. All scanning systems – either conscious or unconscious – have some filters (Ansoff 1979, 157).

When the signal is passing the surveillance filter, it is captured, and will go through a mentality filter (cultural awareness has a strong impact on this filter). During the decision-making process the manager has to reduce the information to a more manageable level by using mental models based on his experiences, heuristics. Some find this harder to do. This might be a hindrance in accepting new circumstances and ideas if the turbulence level of the environment changes. The last filter, the power filter, activates when changes in the environment may cause changes in the power structure of a company. The power filter works so that the managers whose importance would be reduced by the novel discontinuity try to negate or delay vital information. In addition to these 3 main filters there may be a cultural filter which may occur if the management is not in the same wavelength as the signals from environment. Management may take the signals as

insignificant and trust that the “problem” will take care of itself in time. Filters of information are in the figure XIX below.

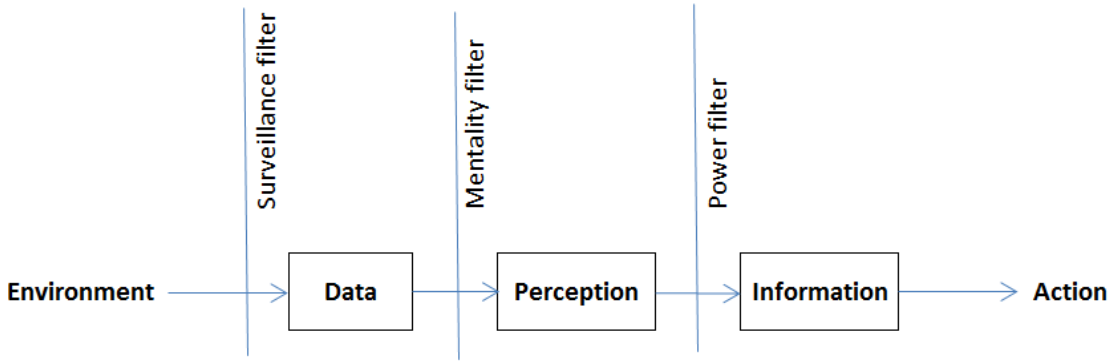

Fig. XIX. Filters of information (adapted from Ansoff, 1984)

The keys to improving firm`s foresight activities

- Widening the perception filter: an extensive map of promising future technologies
- Deepening the mentality filters: how main challenges and customer needs are met with the technologies
- Improving the power filter: how to empower best innovators; who are key customers and how to meet their needs (Kuusi 2006, 5)

It is useful to get senior leaders actively involved with the social-media sources that give rise to weak signals. Spotting weak signals is even more likely when a company can marshal people throughout the organization who have a deep understanding of the business and act as listening posts.

The question of weak signals in business world ties in with our understanding of customer orientation. The most profound misconception of this premise is typically expressed in the old adage that ”the customer is always right”. It is well established that the customer is not always right and in fact it is rare that the customer can answer the question of what they want exactly. Quite often in the case of Company Ltd projects, the supplier knows what the customer needs but the customer wants to control the outcome in the fake belief that they will minimize the risks or such by doing so. By doing this way, they factually may increase the product complexity by scope creep and by introducing product features that are expensive to manufacture. Customer relations are a crucial asset for every business but for foresight purposes companies cannot resort to customer surveys and verbal feedback. This only represents the rear view mirror perspective.

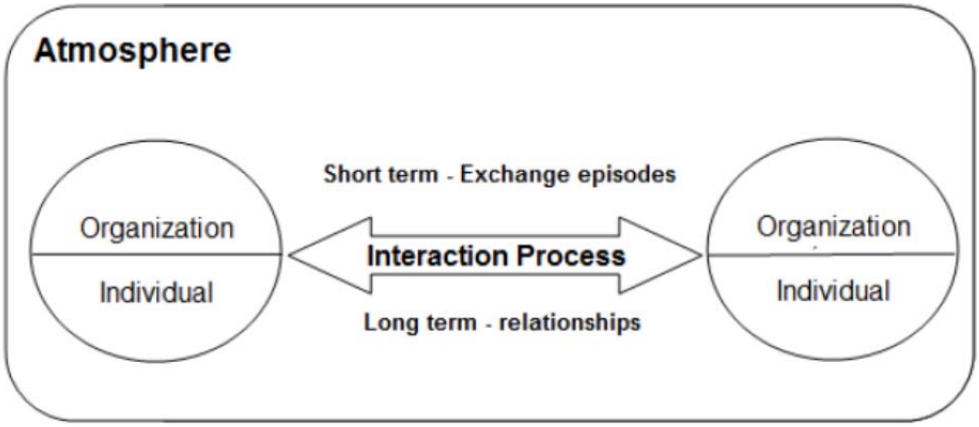

Fig. XX. Interaction model (Kunttu 2011, 13)

The process in the figure XX above occurs in project based business in many organizational level and traditionally only purchaser to seller relationship is recorded in CRM. Customer knowledge management should take into account all the valuable weak signals flowing from organization to another in different levels.

Companies seeking to improve the overall value of their customer relationships cannot rely on the standardized solutions and off-the-shelf analytics that have defined the practice of CRM to date. For most companies, the transition to a relationship-based approach will require a significant shift in mind-set and practice. Managers will need to expand the type of data collected by their CRM systems, customize CRM solutions to the specific types of relationships the company is managing and retrain customer-facing employees to be sensitive to the relational clues they receive and send. (Fournier& Avery 2011, 71)

The interaction process and the relationship between buyer and seller organization are influenced by the characteristics of involved parties: technology, organizational size, structure, strategy and experience, and individuals. In industrial markets technology is an important factor in the interaction between buyer- and seller organizations (IMP Group& Håkansson 1982, 18-19 in Kunttu 2011, 14).

Weak signals are signals coming today through different channels that may tell us about future trends and megatrends. Using weak signals in futures scenarios requires that they are collected actively and registered in some way. The power is in masses and when a signal is amplified by being received from various channels then you can create patterns and test your business and strategy in different scenarios that reflect from the patterns.

Worst traps for an organization in futures work

- Overconfidence in its own vision of the future
- Aiming for consensus

- Preparing only for one possibly wanted future
- Too shallow analysis, scarce resources

Weak signals should pose a critical importance in strategic foresight process and strategy development. Furthermore they can be used as raw material for scenarios in strategy processes (Day& Schoemaker 2005). Managers can also reveal weak signals by asking themselves how they would attack their own businesses as a new market entrant, either by setting up an internal team or bringing in outsiders. (Day& Schoemaker 2005, 2)

Weak signals are not only related to the futures learning process, but they also play an essential role when it comes to defining and testing the strategy of an organization. Figure XXI below refers to the relationship of weak signals and strategy. (Hiltunen 2010, 111)

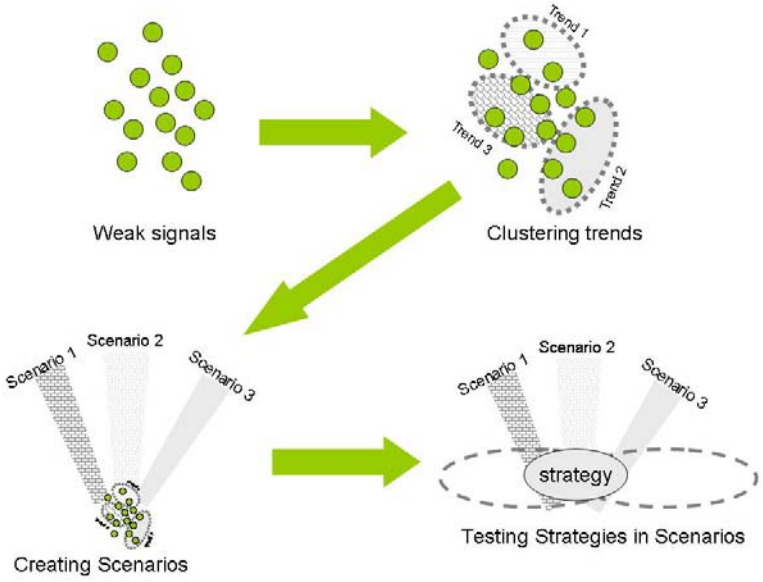

Fig. XXI. Weak signals and their link to strategy work (Hiltunen 2010, 111)

Challenges to foresight

- How can foresight activities help identify new business opportunities
- To introduce tools methods and processes throughout the organization besides the designers
- To analyze foresight knowledge and integrate it into decision making
- To link activities to benefit customers businesses
- Concrete benefits to strategy work

Foresight is the process involved in systematically attempting to look into the longer term future of science, technology, the economy and society with the aim of identifying the areas of

strategic research and the emerging generic technologies likely to yield the greatest economic and social benefit.

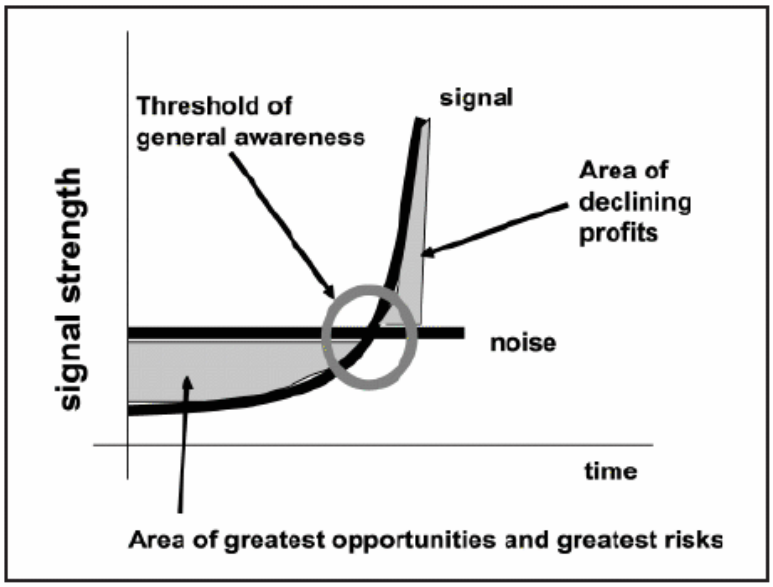

Fig. XXII. Development of a weak signal (Wilenius 2008, 71)

The figure XXII above shows the development of a weak signal and amplification from the background noise into general awareness originally by Brian Coffman. The figure XXIII below shows the emergence of a weak signal from the periphery and the amplification into an emerging issue, trend and finally mainstream.

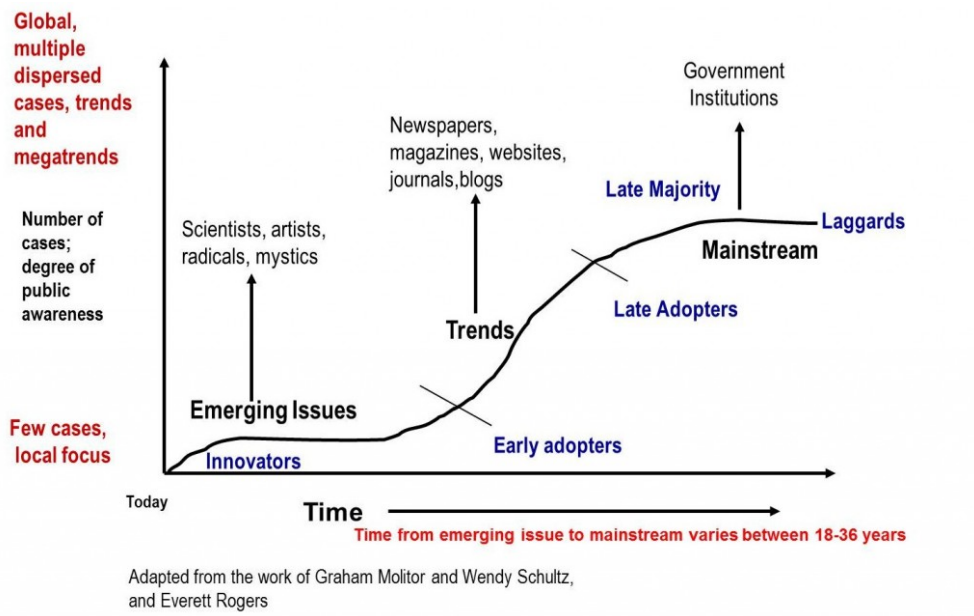

Fig. XXIII. Emergence from weak signal to mainstream (Molitor, Schultz, Rogers 2012)

2.6 The development of expertise

The operating environment of Finnish society, economy and research has undergone a rapid change. International cooperation and competition have intensified, and uncertainties in the global economy have functioned to weaken our expectations for the future. The business sector is currently undergoing severe structural change. Responding to requirements related to the maintenance of the welfare society and sustainable development as well as the need for structural change within society and the economy constitutes the central framework for the research and innovation policy of the present government term. (Minedu 2012, 6)

Learning is about much more than the transmission of information. It involves the adoption of practices, values and norms through different master-apprentice learning processes and creation of new networks of relationships. Formal education provides only the basic preparedness for development of expertise. All the required skills, whether in research, teaching or engineering, students learn by participating in practical problem solving with the more experienced. From this perspective, an important part of the tacit knowledge is embedded in the operating environment, tools and practices. This information is rational in the sense that it cannot be separated from the context it appears in. From this perspective, tacit knowledge is also related to an individual's habitus. The change in habitus is prerequisite for profound learning processes. (Hakkarainen Kai& Paavola Sami in Toom et. al. 2008, 60)

Intuitive knowledge represents non-formal knowledge, upon which the expert is able to find solutions to vague and openly defined problems. Many research points to and even Michael Polanyi (1966, 23) refers to the issue that intuitive knowledge plays a significant role in specialist activities. Intuitive knowledge represents a rule-of-thumb that enables an expert to instinctively solve problems. One manifestation of this is that experts are able to identify promising research ideas and directions of propagation by experience.

Creating knowledge and creating innovation can be understood as epistemic practices. So called innovative communities collect information and experience relating to a challenging sphere of activity transforming it into shared practices that channel the activities of the participants in a way that supports innovation. These practices do not need to be innovative in themselves in any way but as a whole they create a foundation that supports innovation. (Hakkarainen Kai& Paavola Sami in Toom et. al. 2008, 75)

The understanding reached through interviews is that formal degree level studies give a good growing platform into development of expertise. In time capability will grow through deliberate long term practise while knowledge base interlaces with practical application. This is also familiar from the SECI-model. Adaptability is quickly becoming the most valuable asset ad skill one can have because of constant state of change in the working life. Formal education can become obsolete quickly when speaking of niche areas of knowledge. Permanently high level

performance requires experts to cope with constantly changing playing field and fluently moving over boundaries of expertise. Company survival may depend on building an organization that can exploit the four capabilities behind what we think of as adaptive advantage (Reeves, Deimler 2011, 9).

Formal knowledge that is made explicit and associated with a semantic meaning has a crucial importance in the communication between experts in occupations that lean against a long basic education. It is a tool that experts use to develop the industry. (Eraut, 2000;2004)

Job seekers from entry-level to executive are more concerned with opportunities for learning and development than any other aspect of a prospective job. Consequently, job candidates' top criterion is to work with people they respect and can learn from (Valcour 2014).

The vast majority (some sources say as much as 90%) of learning and development takes place not in formal training programs, but rather on the job - through new challenges and developmental assignments, developmental feedback, conversations and mentoring. (Valcour 2014)

Here are several steps you can take to stimulate learning and development:

- Share detailed information with your team about current operations across the firm. Be transparent about the firm's challenges and direction, including such factors as changing customer expectations, new vendor relationships, early-stage strategic plans, and top leaders' thinking regarding the potential impact of industry trends and economic conditions. Invite their questions, thinking and suggestions on these issues as well.
- Support the development of internal social networks that span functions and divisions in order to give employees' a broader understanding of the organization and help them spot opportunities to learn and to add value.
- Instead of a once-annual conversation about career goals at the time of the annual performance review, have frequent short conversations throughout the year regarding employees' career goals and interests, which may not be self-evident.
- When planning your team's work, ask employees to identify both how they can contribute and what they would like to learn. This gives employees the primary responsibility for clarifying what they want to learn and for proposing ways to incorporate on-the-job learning.
- Ask employees to report back periodically to you and fellow team members on what they have been learning and how they are using new skills and knowledge. (Valcour 2014)

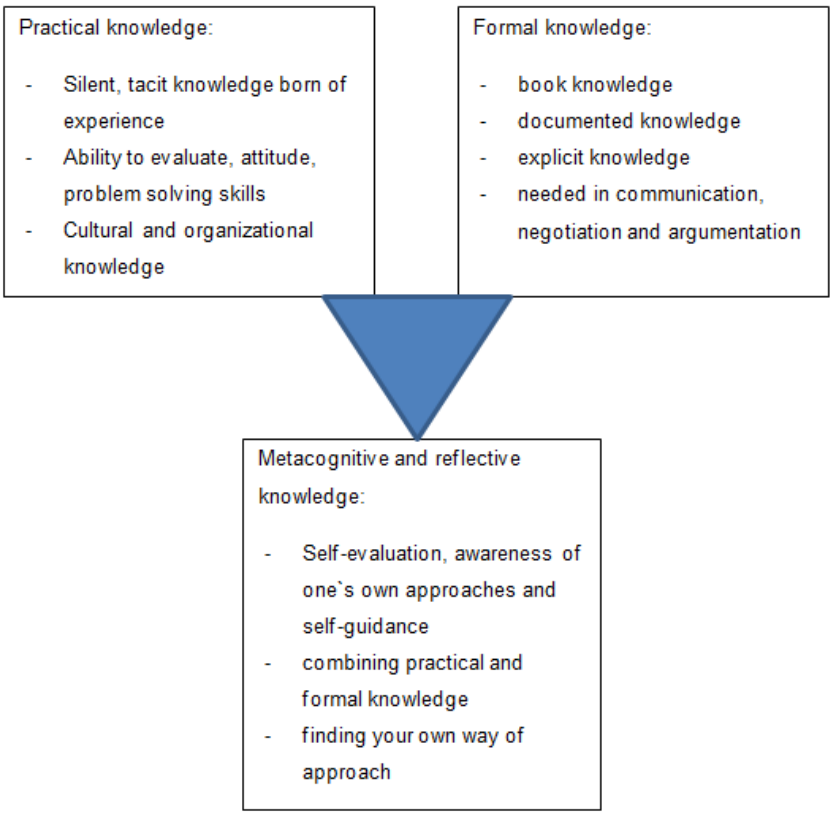

Fig. XXIV. Tacit knowledge as part of expert knowledge (Adapted from Paloniemi 2004, 138)

Figure XXIV above shows one view of tacit knowledge as a part of expert knowledge. In listing the properties that a good expert needs, it is not enough to think of him as an individual and that the person is seen detached from the context. An expert is a part of the environment in which he operates. Therefore in describing expertise one has to take the wide lens: experts close colleagues, networks and his ability to acquire new contacts to gain the required knowledge in new challenges. Expertise research shows that even though capability is tied to an environment it can be restored into the practices of individuals. Capability is therefore a synthesis that draws from knowledge base of the business area, cognitive processes of the people in it and their personal characteristics. Capability is built in discussions and interrelations of the people in that context. For examining the capabilities in some cases the emphasis is on implicit and in others on explicit properties. In the latter case the dimension between expertise and group dimension has been left on the sidelines. (Adapted from Lehtinen et. al. 2012)

Many emphasize the irreplaceability of experienced workers in that such people have the best grasp of processes and may have established relationships with customers that go back decades. A profession is not learned at school but at work and sometimes through mistakes. Thus experienced people and the support they provide are indispensable. (Onnismaa 2008, 84)

The education, training, and “seasoning" i.e. learning by doing of a person can help them along the path to wisdom. Experience can aid in understanding the broader context of issues, seeing how new knowledge can be integrated into existing knowledge, and assigning value to different types of knowledge. Experience like wisdom is partly acquired by means of everyday trial and error.

Yielder (2004, 60-80) characterizes the five dimensions of capability linked with professional expertise: knowledge base, individual cognitive processes, professional practices, convergence inside the business area and personal relations between the actors. According to Yielder, a large portion of what we think of as learning happens without reflection. But only after meaningful reflection can you alter behaviour. Reflection requires critical approach and backwards analysis. Reflection during action becomes possible only when the previous experiences have become part of one`s cognition in the form of mental models. Being an expert includes anticipation that is reflection before action, which seldom has a focus in scientific literature even though it is an essential part of skilled practice.

Expertise is built on shared practices of the workplace. Shared capability and collective intelligence is embedded in knowledge, tools and practices formed in time. (Närhi 2011;Hakkarainen& Paavola 2008, 59-82;Hakkarainen et. al. 2012, 246-256)

In a nutshell one could say that a dialogic expert

- Knows his limits
- Knows what he does not know
- Knows how to ask for help
- Tolerates uncertainty
- Has a humanistic approach
- Reflects on the knowledge gained from interaction and modifies his behavior based on it and based on feedback
- Utilizes diversity and different perspectives (Pyhäjoki in Rouhelo& Trapp 2013, 34)

Individuals (often experts) own responsibility increases in parallel with virtual team formation and reflects on a need to develop corresponding capabilities. Simultaneously companies need to be even more responsive to customer requirements, expectations and needs and to react quickly in shifts. Understanding the big picture, changes, building cooperation beyond borders and sharing one`s own capabilities globally are essential requirements for the expert of the new era.

- Expertise is an integrated ensemble of theoretical knowledge, practical knowledge, knowledge of controlling action and socio-cultural awareness. To develop it deeply they need to be linked together
- key feature of an expert is continuous development of capability and taking on more and more challenging tasks
- expertise is simultaneously commanding the best practices and being adaptive and innovative at the same time
- expert work is collective and networked by nature
- the development of expertise involves the participation of experts in social work practices
- high level development of expertise requires mechanisms from working life and education system mechanisms that support long-term and innovative deliberate practice thus enabling the pursuit of excellence. (adapted from Lehtinen et. al. 2012, 13)

Interviews in the case Company Ltd confirm the theory somewhat. It was stated by the experienced and unexperienced alike that formal training only gives a basis and the actual learning happens by doing. The assignments you receive become more and more complex and learning occurs on the go. Peer support is seen as very important but the practical life puts different hindrances on the way – lack of time being the one mentioned the most.

2.7 Synthesis - Why and how to combine the three subject areas

Changing and uncertain times require new ways of thinking and new ways of acting. We can take good actions only if we can make good decisions. We can make good decisions only if we have good understanding. We can have good understanding only if we have good knowledge. We can have good knowledge only if we know how to learn. (Bennet& Bennet 2008, 91)

Every company has seniors who are admired for their abilities. They may have decades of experience. Typical mistake is to leave all the tasks in his expertise area for them to deal with. Others workers may shy away from those topics because they are seen to belong to that one expert exclusively. The problem arises when he is ready to leave the company or retire. The better the expert becomes the less other people know about what he is doing and how is he doing it if there is no knowledge sharing. Also from a newcomers perspective a senior's expertise can seem too far to reach. This should be reversed. The more the expert knows the more he should be given opportunity to share with others.

In a typical industrial organization of a Finnish SME company the age pyramid is clearly visible. With newcomers to the industry coming in with their newly learned information from their basic education and the veterans in the workplace having their tacit knowledge of the industry and how to cope with the requirements, mutual respect could be expanded by sharing. In a situation where relevant information is necessarily not all written down is clearly a situation where by sharing the knowledge, that all contributors have, a company could avoid the risk of losing that knowledge in time.

In working organizations there are plenty of people that have tasks involving elements from expert role such as problem solving, decision making and different types of data management. It would be a mistake not to recognize these as expert roles from management point of view and in terms of mapping organizations social capital. It is fully relevant that these people would be seen from the capability point of view rather than as holders of a certain title or responsibility written in their work description. When knowledge or expertise is defined critical it typically entails that this expertise is developed in time in that context and learned by doing. This type of expertise can be hard to define understand or apply in other contexts. What also develops only in time is the ability to evaluate issues from different perspectives in a cross disciplinary way like medicine, psychology, sociology and social sciences. In an industrial context this could be e.g. financial, manufacturing, quality and environmental capability. One of the key roles an expert has is to interact in networks inside the organization and outside it. Networking and communication are at the center of organizational performance. This can be even the biggest loss in a company when an expert retires with all his contacts. Depending on the quantity of interdependent links and the quality of communication, the organization succeeds or withers.

In team work e.g. in sales and product development where people are solving problems and developing solutions all from their own perspective creates a lot of learning. Every member could learn from each other and give their own ideas for the others to use. Knowledge sharing would enable organisations to avoid situations where the wheel is invented over and over again and create an atmosphere where “new” and “old” knowledge is valued to the same extent. Doing this in a clever way the organization can create learning beyond borders and generation gaps. Learning will together with the weak signals coming from the customer interface enable an organization to have better yield from the limited R&D and product development resources for the end customers benefit and internal efficiency requirements. The questions below represent a simple test to the maturity and ability of the company to enter into an advanced knowledge management initiative

- Does this organization recognize the value of tacit knowledge in practice?
- Is only formal education valued or is the tacit knowledge of the experienced people considered valuable as well? How does this show in practice?
- Is the tacit knowledge shared and made explicit?
- Is there such internal competition that sharing tacit knowledge becomes difficult?
- Does the organization accept diversity? How does the organization utilize the potential of diversity?

Intangible assets and intellectual capital are often the key factors in companies that rely on innovation as the key strategy in bringing competitive edge in the market. According to resource-based view model (e.g. Penrose 1959, Wernerfeldt 1984, Barney 1991) a company’s competitive advantage can be explained by resources and their characteristics. To create competitive advantage the resource must fulfil these characteristics:

- Resource is important to the company
- Resource is permanent and sustainable; you have to be able to use it more than once
- Resource is scarce
- Resource is hard to copy
- Resource is hard to replace

The dynamics of global competition, technological advancements, corporate restructuring, and unstable economic conditions are converging on business and making it more important than ever that organizations learn and adapt to make improvements in performance. Naturally you would have to improve on all fronts but sustainable competitive advantage comes from differentiating in hard to copy resources like the capability.

“No amount of sophistication is going to allay the fact that all your knowledge is about the past and all your decisions are about the future” - Ian E. Wilson

Those wise words of the honorary Doctor and member of the Order of Canada tie in nicely the futures and present of the firm. At this moment can the management team of a firm name the top five emerging trends that are vital to company performance? How much agreement is there about their impact or even of their existence? What is the company doing about it and at what time schedule? Does it have the capabilities and funding to cope with the consequences? How does it go about constructing a reality of what it is experiencing and make sense of it all. Knowledge management provides a way of understanding the processes of acquiring, sharing, applying and retaining useful knowledge to respond to knowledge challenges presented by the environment (Bennet& Bennet 2008, 88;McCann& Buckner 2004). Effective OL can develop beneficial shared understandings of the organisations business environment (Campbell& Armstrong 2013, 251)

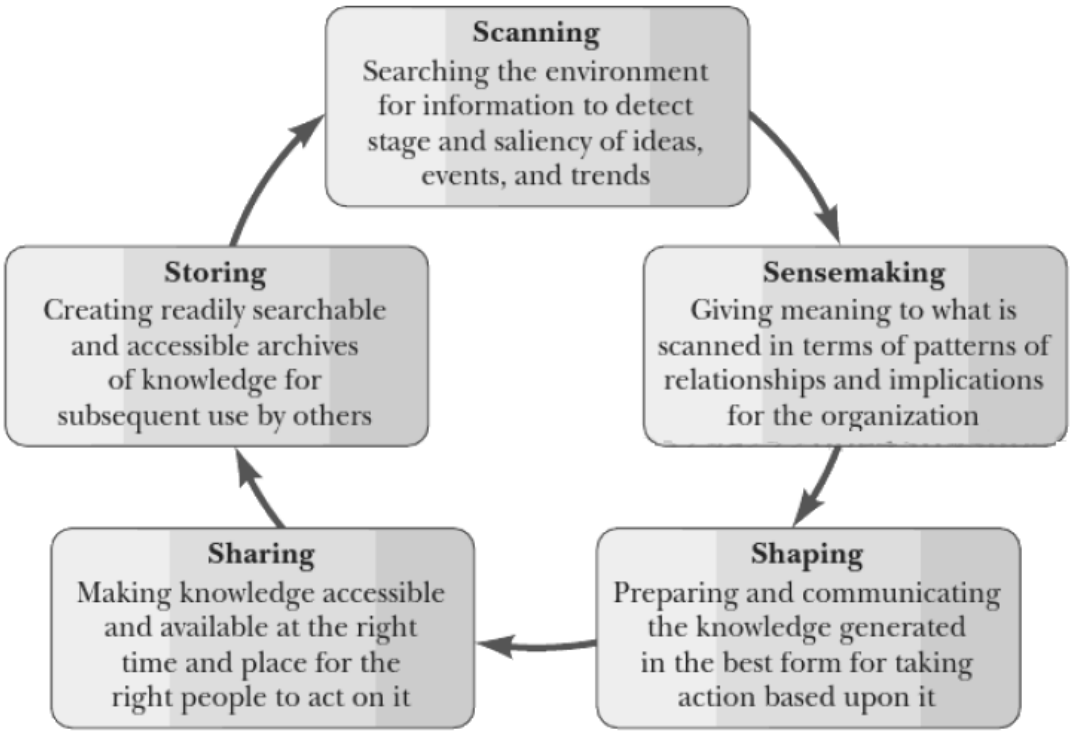

Fig. XXV. Five core awareness processes (McCann 2012, 124)

Scanning an environment for knowledge, in the figure XXV above, is fundamental to cognitive functioning. There are several operation choices and routines associated with scanning that make significant differences in how effectively it occurs. There must be recognition that active systematic scanning is critical to agility and resiliency reflected in the sustained investment of time and effort devoted to it. Such scanning must be also premeditated and rigorous.

Sense making is giving the collected information meaning by identifying patterns and relationships and implications for the organization. Shaping is effectively how to best communicate the knowledge so that others can make the best use for it. Sharing the information must be managed in a specific way for each organization e.g. by a repository or social media tools. Storing the shaped and shared knowledge should guarantee access and re-use of the knowledge.

Innovation

Synergy interviewed in the spring of 2013 (V-S Yrittäjä 2013) people from research, product development and innovation management from 50 Finnish companies. Companies were from different business sector and were among the 100 largest companies in Finland. 40 percent of the companies had more than 100 employees.

Interviewees identified the lack of ideas and low business potential in them as the biggest challenges their company was facing. This was despite the fact that 80% of the companies had clearly defined processes for developing new products or services. The main barrier to lack of ideas was that product development is too isolated from customer interface and sales. Coming up with ideas was too much a company internal task, left for research department to manage.

Many companies rely too much on internal resources when looking for new product or service ideas. They do not involve the customers enough in their efforts to gain a feel for what could be a successful product on the market. Nor do they sufficiently utilize partners or research. It was also apparent from the studied companies that in practice, the generation of ideas is often limited to a small group of people instead of leveraging the whole personnel.

In general, the positive influence of knowledge management practices on innovation (both radical and incremental) has been researched and supported by a variety of authors. (Sigala& Chalkiti 2007, 463) Contrary according to Chesbrough and Kusunoki (2001, 208) continuous incremental accumulation of integral knowledge can lead to a technological shift towards a modular phase. That entails that technical interdependencies and dynamism thereof can lead to misalignment of the organization and the technology it is developing. A company that participates both in upstream material and downstream components can only capture the value they add at each stage of the value chain. Based on observation in the case on Company Ltd that is quite evidently the case.

Overall, it is evident that knowledge management transcends business departments and can enhance operational performance of any business process (Sigala& Chalkiti 2007, 466). Both innovation and financial outcomes are enhanced by the high degree of tacit knowledge (Leonard& Sensiper, 1998; Cavusgil, Calantone, Zhao 2003, 15)

3 INTERVIEW

With these interviews the researcher expected to find out what the carefully selected people, who represent opposite ends of the experience timeline, think about how expertise is developing in relation to sharing mainly tacit knowledge. The second objective was to find out how people are willing to participate into the process of making that knowledge explicit and utilizing it. This links to the research objectives in revealing the circumstances and attitudes in the case Company Ltd that contribute to knowledge sharing. Weak signals and learning were not covered in the interview in the form of questions.

The plan was that the interview is not structured but will encourage the interviewed person to freely explain his/hers views on what they feel is valuable to know in each role. Interviewer then collected the key ideas and words that come up most frequently and analyse it like below.

The comments in full listing in annexes 2-3 are numbered to correspond with the persons below to safeguard the identities of the interviewees. They are listed below in random order.

3.1 Interview plan

Interview in the organization was planned so that seniority and junior views would be well balanced to have an understanding on the generation gap that might exist in the opinions and attitudes of the people. Persons were taken from all main disciplines in the business unit that deal with customer interface and knowledge management issues on a weekly basis. All the four seniors with a history of more than 25 years were interviewed. Counterpart members from the other end of the experience spectrum were selected firstly to come from same disciplines as the seniors but also with a view that they would be in similar work assignments as the seniors had experience from. This notably contributed to same type of vocabulary used and on the experiences they have from day-to-day issues faced. One interviewee was on the limit of being not so junior with a 7 years of experience in the company but at the moment of the interview the experience from the discipline in question was notably shorter and the person was the least experienced of the selection that was available.

In the table 9 below there are some key properties of the interviewees: highest reached education, age, years in the company (which may consist of more than one period) years in working life altogether, discipline served currently (and previous ones in parenthesis) and acronym for the name. Some of the people serve more than one discipline i.e. have more than one hat on, so the one selected as main discipline is the one they officially mostly work or answer for. As an example a person can be a mechanical designer and belong to design department regarding administration but simultaneously work as a project manager and give orders to people in the matrix organization of an individual project.

Table 9. Interview plan (Korhonen 2014)

Name	Department (other)	Years in working life salaried	Years in the company	Age	Highest education
SENIORS					
EM	Quality (Design, Project management)	32,5	32,5	61	M.Sc. Mech.Eng.
MR	Design (Project Management)	36	23	62	M.Sc. Mech.Eng.
IL	After Sales (Procurement, Project management)	30	25	46	Technical college + OKK teacher (non-university)
PO	Sales	32	4,5	63	B.Sc.+M.Sc.Econ.
JUNIORS					
AT	Project Management (Design)	11	7	36	B.Sc. Mech.Eng.
JK	Design (Project management)	4	4	29	M.Sc. Mech.Eng.
MP	Sales	1	<1	23	BBA

Participants were invited to a one-on-one discussion with the interviewer with a calendar call that would make it possible to participate fully without interruptions. All of the participants could either accept or decline the invitation. All of them accepted the invitation and were willing to voice their views on the subject matter. They were also told before the invitation what would be the subject area for discussions and what would be the purpose and use for the material. All participants were promised confidentiality in a way that revelations from the interview would not be used against them in some other context of their daily employment.

3.2 Interview practicalities

The individual interviews took place in May 2013 in a company negotiation room with no windows or other disturbing elements. There were no interruptions and the interview was planned for a 1½-2 hours length but was not concluded until the interviewee had said all that was on her/his mind.

The interview was conducted in Finnish and was recorded on a voice recorder that would facilitate transcribing the material and returning to wording in order to capture the meaning afterwards. The interviewer transcribed the material straight from Finnish voice files into English key phrases during the same week of the interview. Voice files remain in the sole custody of the interviewer. The interviewer had a pen and a paper to keep a mind map of the progress of the interviews.

As the format of the interview was unstructured, the interviewees were introduced the three discussion main points and interviewer had a list of questions to guide the discussion into the main 3 directions. The only direct question requiring answers in addition to the background and warm-up questions was if the interviewee understood the term ‘tacit knowledge’. If he/she did not it was explained. When leading was needed to invite more reflection from the interviewees on the subject areas, the questions were asked similarly from all of the interviewees. Depending on the reflection skills and the level of experience and confidence they felt in expressing their views on the 3 main points, some interviewees needed more invitational questions than others.

Interviews were concluded by thanking for the contribution and further reassurance that the input given was only for the purpose of the thesis. All interviews were included in the analysis and key sentences that represented the core meaning were picked for the two-level analysis.

3.3 First level analysis

Sentences or phrases used in the interview for first level analysis are represented in the appendix 1 to full extent. Key words and ideas that were extracted from them are represented in the table 10 below for seniors and juniors separate. To become a key word a word had to be repeated more than twice or has to be specifically emphasized by the interviewee as important. Where the word is in Italic there is commonality between juniors and seniors. Second level analysis will feature conclusions and proposals for actions to be taken in the organization to facilitate a more efficient use of tacit knowledge and weak signals for the organization to learn.

Table 10. First level analysis (Korhonen 2014)

Concept or key word, seniors	Concept or key word, juniors
What`s wrong with this picture: Decision making maturity Corporate culture Resource always limited *Communication* *Cooperation* Making tacit knowledge explicit by documenting some key things on a base template Process discipline Getting and keeping the talent Developing ourselves/investing Seniority counts in the customer cultures	**What`s wrong with this picture:** Teamwork *Cooperation* Joint effort Meeting practices Putting pressure on customer Cultural differences Way of working not standardized Experts should have their say *More communication*
How we work together: Growing pain of the organization *Attitude* *Willingness to learn* *Prioritizing* Self confidence Ability to estimate Eye for the game *Relentless* Sign of the times Humility Human approach Active Trust Chemistry Corporate culture Fear Patience Tolerance for pressure Self-starter	**How we work together:** *Prioritization* Roles Orientation *Attitude* *Willingness to learn* Courage *Relentless,* persistent Encouraging Work hard Lack of time compels to shortcuts Customer is king Mediating Open atmosphere
Documentation: *Documentation management* *Process description* *Reading the documents* Access to some documents Obsolete documents	**Documentation:** *Documentation* *Has anyone read all of them?* Who can evaluate validity and value to others? *Process description*

Sharing tacit knowledge: Keywords Relevancy *Activate users in process* Meetings are good Apprentice for critical issues Attitude towards due process	**Sharing tacit knowledge:** Talking about it Checklists for factors to be taken into account Keep it simple In everyday use Everyone contributes Daily routine
Beginner to expert: Formal training gives only a base Take advantage of the seasoned experts knowledge *Learning by doing* *Peer support* Team should learn from individual mistakes No cover-ups Data fragmented in system Practical approach towards products *Experience is not valued* enough	**Beginner to expert:** *Learning as you go* *Experience is valued* highly among workers What are the barriers to *peer support*? Self-motivation to improve Working pairs Work in a project as a helper before you get one of your own
Learning: Knowing who knows is also tacit Willingness to participate in making knowledge explicit Learning by participating Working pair for a newcomer Writing is painful for Finns Tone down the ego Competence matrix	**Learning:** Learning by traditional ways Challenges with industry specific issues Role orientation
Product development: Wrong product development driver *No planning ahead* *Caught with pants in ankles* Too short development times Customer is king Group policy against development Losing our headway Project always prioritized over product development Young guns don`t even know what has been studied before Controlled library for serial production	**Product development:** *Foresight wanted* *Long term planning wanted* What has already been tried Sales driver REX-framework Simulation before proto

Tacit knowledge is:	**Tacit knowledge is:**
Gives tools for evaluating the big picture Nobody welcomes it We have a lot of it Helps day to day work People don`t care Whoops! To know who knows	Tacit knowledge as a concept Inside the head *Important*
Meeting the customer: What tacit knowledge/weak signals you might have? *Cultural knowledge* Enduring pressure Ability to demand Same bible different interpretations Noticing business risks Decision making routines Reminding customers of our existence	**Meeting the customer: What tacit knowledge/weak signals you might have?** Behavioral *Cultural pressure points* Tolerance for unambiguity Technical Seniority requirement Escalation
	Pressure from customers and suppliers: Customer applies pressure on us Defending our product features Feeling unsure Mediator

All of the senior and junior interviewees wanted to elaborate, on what is not working as they would imagine or what would be good for the organization, without asking for it specifically or wanting that to be expanded on. That shows a distinct mind-set and need for developing the knowledge management processes of the case Company Ltd.

Juniors shared some additional thoughts on feeling the pressure coming from facing the customer and need for support in coping with it.

3.4 Second level analysis

Second level analysis in table 11 below finds common denominators and proposes policies or actions to facilitate more efficient use of tacit knowledge and weak signals in organizational learning.

There is general discontent that there is no long term visibility and a lack of communication on strategy and no long term visibility on product development planning. There is general discontent on how the small group meetings function and how they are useful outside the realm

of general communication i.e. letting people know on decisions taken and on status of the projects. Some difficulties are being swept under the carpets and some are raised to an un-necessary level of attention based on reasons that are not properly communicated. Often the discussions in general meetings go on a detail level that immobilizes people for discussions on minute details of the product features that could be discussed with a better attention in a specific meeting for that purpose. Project managers tend to also reflect on their project status to be better than it actually is in either fear of getting additional attention or in hope of being seen as a better employer.

Many times the researcher has witnessed a discussion where a roomful of persons are totally talking past each other and are more in a defensive reasoning mode than actually dealing with the issues. The problem with the experts claims of a "stupid" customer requirement or "some other person" in the organization is to blame is not necessarily very wrong but it is not very fruitful either. By constantly changing the focus from one`s own actions to the one of others brings learning to a stop. To put it in a practical framework: you have to be able to say to a customer that his problematic behaviour is causing difficulties in a project, otherwise you are using defensive reasoning and externalizing the problem by saying that "I could not do this or that because the customer would never have…or will be offended… or similar reasons".

Table 11. Second level analysis (Korhonen 2014)

Policy Seniors	Policy Juniors
What`s wrong with this picture: Internal and external reasons Work alone but bigger issues decided together ⇨ *Sharing knowledge* ⇨ *Travel reporting* ⇨ No long term visibility ⇨ *Need more "real" communication* ⇨ Talent management plan	**What`s wrong with this picture:** Internal, external Work alone but bigger issues decided together ⇨ *Sharing knowledge* ⇨ Standardized work method ⇨ *More communication*
How we work together: Responsibility to get the job done Work ethics Personal characteristics, can they be learned Is there a prototype of a project manager? ⇨ *Attitude* ⇨ *Human touch* ⇨ Humility	**How we work together:** Process improvement in orientating new workers into and defining roles ⇨ Orientation process improvement ⇨ Role description Responsibility to get the job done Work ethics Personal characteristics, can they be learned

	or taught ⇨ *Attitude* Organization treats newcomers well approving supportive company culture ⇨ *Nourish it*
Documentation: Explicit knowledge available ⇨ Drawings from old projects ⇨ Too many documents ⇨ *Everybody should take part in developing the documents* ⇨ How to quickly learn where to find an old document someone may have made? ⇨ How to spot the tree from a forest	**Documentation:** Document responsible ⇨ *Everyone contributes to the base template document* ⇨ Everyone starts a new document from the base template document ⇨ Design rules manual ⇨ Check the documents and age the obsolete ones ⇨ Collect the project specific type or validation tests to one place Lots of REX and tacit knowledge made explicit in documents ⇨ Does process description reflect the activities in real life, update
Sharing tacit knowledge: All the tools are there to share ⇨ Attitude towards why the meetings are important ⇨ Rewarding sharing	**Sharing tacit knowledge:** Divide between oral and written ⇨ Full line survey about what people need information about most ⇨ Identify what can be shared by peer support and can be lost in time and what needs to be preserved in writing
Beginner to expert: Education paves the way ⇨ There should be more time ⇨ Respect for experience shows in words but not in actions ⇨ Don`t hide mistakes	**Beginner to expert:** Introduce support person skills matrix to newcomers ⇨ Evolve current skills matrix and make it available as a tool ⇨ Documentation tasks to newcomers ⇨ Support role before responsibility role, open the tasks to apprentice scrutiny and encourage Q&A ⇨ *Working pairs*

Learning: Takes change in attitude ⇨ *Working pairs* ⇨ Make the threshold lower for Q&A ⇨ Competence matrix instead of skills matrix	**Learning:** General training to newcomers about industry specific disciplines like RAMS. LCC, Norms ⇨ Create introduction documents, keep it simple and require Q&A ⇨ Keep up the weekly meetings and encourage asking questions ⇨ KPI of a role?
Product development: No future vision ⇨ Too little ⇨ Too late ⇨ Serving too few ⇨ No radical innovation just incremental	**Product development:** Formalize innovation management and product portfolio thinking ⇨ Innovation management plan ⇨ Product portfolio with life cycle plan ⇨ Every designer should visit a least some trade show Keep up the discussion between sales and product development ⇨ Report on what customers are asking for Theme day in conjunction with a new development program (even if it comes from a project need) ⇨ Try it once and see if it works
Tacit knowledge is: Not really appreciated or utilized by the newcomers ⇨ What is impeding? ⇨ Professional pride	**Tacit knowledge is:** Make people more aware of what tacit knowledge they might have compared to the rest of the organization ⇨ *Visit report form* ⇨ Keep up oral reporting in weekly meetings
Meeting the customer: What tacit knowledge/weak signals you might have? Eye for the game comes with experience ⇨ *Reports from meetings*	**Meeting the customer: What tacit knowledge/weak signals you might have?** Make people more aware of what tacit knowledge they might have compared to the rest of the organization ⇨ Training for customer encounters with different cultures ⇨ Lessons learned from incremental product development projects, keep it simple

	Pressure from customers and suppliers: Escalation pattern Prioritization authority ⇨ Role authority for decisions ⇨ Boss must back up

3.5 Reliability and validity

As this is an open interview it is unlikely that one will ever get the same result twice and as the two seniors are going to pension soon they are not even accessible any more. The interviewed people were asked to comment on the findings and conclusions afterwards to have their comments on the findings and conclusions. The interview will however reflect the status and feeling of today and help point out the way towards the need the means and the usefulness of making the tacit knowledge explicit or not in the case Company Ltd.

The fact that the researcher has worked in the organization for almost 10 years also gives tacit background understanding to the interpretation part. The interview and interpretations will be externally valid because the subject is portrayed exactly like it is and it can be generalized selectively. Internal validity can be debated but will prove the scientific approach and management of the subject. The concept of validity is debated and since the terms were born in the realm of quantitative research they are often avoided in qualitative research. The interview material will not be made available to anyone else as this was one of the ground rules set for the interview in order to get honest no-fear answers.

Reliability in quantitative research is often measured by how two independent researchers can reach the same results with the same data and application. In qualitative research, reliability is improved by a clear description on what were the setting, environment and place where the data was gathered. One can also explain what interferences may have occurred during and how much time was used. Researcher`s self-analysis of the situation can also be included. Reader should also be explained the basis for material classification. It should also be explained how the conclusions were reached and what they are based on. It helps if there are some original materials available from e.g. the interviews. (Hirsjärvi, Remes, Sajavaara 2000, 214-215)

All of the aspects relating to reliability and internal validity have been explained in the previous chapter.

3.5.1 Findings and observations

During the interviews the experience related aspect of tacit knowledge came up spontaneously in many instances. When the interviewees referred to experience they meant knowledge, skills, facts and contact network that are not acquired by formal education but by experience gained from working with the issues related. Education establishes a baseline that is more or less required depending on the role but only by experience can you reach a specialist expertise level. Also the general organizational knowledge is formed through experience under a longer period of time answering e.g. to the question “who do I ask if I don`t know”. It was also pointed out that working together with the more experienced persons exposes the possibility of opening up the chain of reasoning when solving a problem where tacit knowledge may be revealed and a less experienced worker can learn. Senior workers could in turn lower the threshold of asking for help by opening up the chain of deduction and reasoning making it easier for the juniors to draw their own conclusions. After all it is not always the seniors that are right even though they have more reference system to back up the decisions than newcomers. Seniors have their own filters of perception.

Experienced workers have imagination and keep their eyes and ears open. They recognize leads and can read between the lines. Many respondents also mentioned the ability to understand the big picture. Experience and wisdom are especially obvious in communication and listening skills. (Onnismaa 2008, 83;Joe et. al. 2013, 923)

Tacit knowledge seems to be best transferred when an older professional and a fresh apprentice work together and knowledge is passed bilaterally (Onnismaa 2008, 84).

Sharing the knowledge and the need for a real open communication i.e. reflection came up in the majority of the interviews. The same result is often shown in company surveys about the working conditions. The conclusion management should draw is that there is not enough of open communication and facilitate it by creating forums where it can be improved. Finally it will always be in the hands of the people anyway. It is easier to complain than act on it and take the first step. Nevertheless improvement is expected.

Workers are mostly happy about how the company works generally and how it welcomes newcomers. Seemingly the same understanding was shared by juniors and seniors alike that attitude towards work is what in the end counts in how good a result come out of daily activities around the customer projects. More structure was wanted in describing where the responsibilities lie regarding some work tasks – as in job descriptions made public. Observation shows that they are in fact public and some of the workers just do not know it. Naturally the job description does not detail all the minute tasks within roles but the big picture is relayed.

In the personal development from newcomer to expert all interviewees agreed on that learning occurs by doing and supported by the seniors in details. Newbies around engineering discipline would have liked to see some introduction documents when diving into the plethora of norms and regulations that govern the product features. They shared a feeling of a Russian swimming school: there it is – now swim. Meeting practice to share project status was seen as very beneficial even though sometimes diving too deep into the subject matter of the individual challenge. On the other hand it creates the Ba where solutions can be shared and learning can occur. Seniors pointed out that sometimes the input is not very welcome. There are possibly different reasons behind that statement, professional pride, filters and more.

Juniors felt the need when facing the customer in more difficult cases to have an escalation route to resort to if agreement is hard to reach or anticipated to do so. For that there is a clear pathway – the organizational structure – all you got to do it ask for the ketchup.

Missing link is in the field work. Mandatory reporting was once in place to catch the lessons from the customer interface. One idea could be to re-introduce that. In fact some people have never stopped reporting because of the clear benefits it has in e.g. returning to a five year old case encountered on the field.

The expert retires but the expertise should not.

4 EXPLICIT VERSUS TACIT KNOWLEDGE IN THE CASE COMPANY NOW

"The organizational knowledge that constitutes 'core-competency' is more than 'know-what' explicit knowledge which may be shared by several employees. A core competency requires the more elusive 'know-how' - the particular ability to put know-what into practice". (Brown& Duguid, 1998: 91) In general, where institutionalization of a competence area is strong, resource combinations are less likely to occur. Greater the individual`s identification to the competence to which they belong, the lower will be the value attributed to knowledge from other competencies. (Galunic& Rodan 1998, 1200)

People have a profound need to accomplish something they can be proud of. Substance leaders may have a hard time giving space to their subordinates because they seem to know everything better. That is not leading people though. It seems that juniors do not want to receive the teachings of the experienced. In the case company it is perceived as an obstacle or hindrance in daily work and the juniors are not interested to listen to the advice of the senior workers. Maybe it is weak self-confidence? You reveal you own incompetence when you ask for an opinion. But it pays to ask – many issues can be seen in surprisingly different ways.

When there is too much workload you notice neglecting the very important task of sharing tacit knowledge. This can be noticed not really in how information is shared but more in informing on how decisions were made and what the contributing factors were. What happens to ideas, questions and tips? Around a coffee table and sitting in an open office you get quick feedback but when working from home the ideas tend to be left un-tested. All the tools are often there to be used but it takes a certain approach and courage and organizational culture to do it. At the simplest level you could share a piece of idea that seems interesting on a relevant discussion forum #question, #hint, #idea or #observation.

When a company knows the value it intends to provide and to whom, it is easy to begin to link its knowledge resources in a way that creates value. Companies that want to differentiate their products and services, to respond quickly and effectively with the right solution the first time, and to serve customers in a coordinated, consistent, intelligent, innovative and knowledgeable way will be driven to embed knowledge management into their culture.

Tacit knowledge generally should be shared because

- that guarantees the performance, continuity and quality within the organization
- skills and knowledge become visible and they can be developed
- tasks become visible and can be developed

- best practices can be shared with all
- different types of knowledge can be exploited
- well-being of the work community is improved
- sense of belonging and commitment can be enhanced
- atmosphere of appreciating capability can be created
- sharing knowledge can be a matter of pride and a positive duty (adapted from Virtainlahti 2009, 107-108)

Tacit knowledge sharing should be avoided if

- it is tempting to misuse innovation and business ideas
- tacit knowledge is obsolete or wrong
- tacit knowledge contains prejudice, bias or bad attitude (adapted from Virtainlahti 2009, 112)

The dangers of not having a system to collect and distribute tacit knowledge include:

- incomplete, inaccurate and limited information for decision-making
- ineffective use of precious employee time to obtain the right information
- poor collaboration among groups who make uninformed decisions
- lack of accurate, real-time information in the right people's hands when they need it
- weak compliance with regulatory rules, resulting in possible violations and fines (Hitachi consulting 2005, 4)

Based on the researcher's observation, the case Company Ltd could be described as the typical SME company in Finland in terms of knowledge management. Lots of the knowledge is embedded in the documents that have been produced based on customer requirement, for specific needs in specific customer projects. A special aspect of the knowledge is that it is strongly related to the product and it`s features. The knowledge that is in tacit format is mainly about the way in which specific design decisions were made and what was considered during the development. In more and more cases where a company needs the knowledge of how it is increasingly difficult to find the reasoning and reflections that took place.

As the case company is working in a project mode and mostly in export B2B type of environment all the basic KM systems are in place and working. The company has intranet for general corporate matters, skill matrixes mostly to satisfy quality system requirement, file share area (but no document management system) that is structured around products and projects.

Organization has good internal tools to communicate in meetings and technology to do it online as well. Tacit knowledge is not evaluated or made explicit but the awareness of the importance of it is rising in the case company.

4.1 Knowledge assets in the case Company Ltd

A Company`s life is based on the interplay between its strategy, structure and processes. Organizations constantly refine the mechanisms by which they achieve their purposes - rearranging role and relationship structures and processes. The mere existence of knowledge somewhere in the organization is of little benefit; it becomes a valuable corporate asset only if it is accessible to the workers, and its value increases with the level of accessibility. Below there are some knowledge assets identified from the interviews and by researcher observation following the classification given in chapter 2.5.3 Knowledge assets.

4.1.1 Primary purpose for a repository

These four types of knowledge assets form the basis of the knowledge-creating process. To manage knowledge creation and exploitation effectively, a company has to understand its wealth of knowledge assets. However listing the existing knowledge is not enough. Knowledge assets are dynamic and new knowledge assets can be created from existing knowledge assets. Knowledge assets are both inputs and outputs of the organization's knowledge creating activities, and hence they are constantly evolving. The goal should derive from strategy and facilitate the capture of lessons learned, have easy access to expert knowledge, help answer reseller’s questions and FAQ, help improve product development, improve subsequent projects and share experiences. When the wealth of knowledge is large and it clearly represents a critical factor in the competitive landscape the firm would do well to arrange a deputy system to the critical capabilities at a minimum.

4.1.2 Repository 1 – Experiential knowledge

Shared tacit knowledge that is built through shared hands-on experience amongst the members of the organization working in projects towards the customers and suppliers alike represents a huge portion of the daily routine in the case Company Ltd. Based on observation the company could improve the quality of decisions and the versatility in the sense making by creating a Ba that would facilitate peer support without critical atmosphere. Weekly meetings and specific subject-based specialist meetings tend to meet the process requirement and produce decisions. Often times though reflection does not seem genuine and the input of experienced members is not seemingly valued. Reasons for that should be explored as they clearly represent a firewall against learning. The organization works in good spirits in general. Some tensions exist as usual and seemingly there is a negative argumentation towards customer requirements that aim to externalize the actors from the problems that are being faced in the projects. In the interview`s the members expressed their concern towards the quality of communication, meeting practices and decision making maturity. It was also pointed out that the way of working is not standardized and that causes some inconsistency.

4.1.3 Repository 2 – Conceptual knowledge

Brand equity, concepts and designs are examples of conceptual knowledge assets. They are hard to measure and get a grasp on. Contracts awarded seem to indicate that concepts and designs are competitive in the market place. Brand is well known in the market. Challenges come from the fact that the company is owned by a private equity fund and sometimes they impose changes in branding and relevant communication that is not consistent with the message the division would like to take across to the customer base. In the previous ownership change the brand names changes completely and surely contributed to discontinuity that could be felt from the customers through questions like “is this name still in use?”

4.1.4 Repository 3 – Systemic knowledge

By far the largest repository is the one relating to technologies, product specifications, manuals, and documented and packaged information about customers and suppliers. The structure is derived from the technical possibilities of the file management system but there is no contextual management system in place. It was widely commented in the interviews that it is increasingly hard to find the relevant information or knowledge from the file system. Intellectual properties such as licenses and patents also fall into systemic knowledge category.

4.1.5 Repository 4 – Routine knowledge

Know-how, organizational culture and organizational routines for carrying out the day-to-day business of the organization are examples of routine knowledge assets.

In a customer facing situation more than once it has happened to me and to my colleagues in engineering and after sales that in a fault finding session there is nothing wrong with the product itself. Customers knowledge of the product and it`s features is not sufficient to expect the designed functionality or he has not familiarized himself enough with the supplied documentation to even know what to expect. Suggested failure in function is based on wrong assumptions. In this case the work process is social in nature and involves the customer as well as the product. The real problem occurs in the relationship between the customer and the product, so knowing how to “fix the customer” is as important as knowing how to fix the product. This is in line with the findings of Orr (1990 in Brown and Duguid 1991). This shows that the knowledge which the repairman requires is contextualized in the users practice rather than the practice of the product`s designer. By sharing these lessons learned practitioners work as a cohesive Community of Practice - CoP (Brown& Duguid 1991). In this case tacit knowledge is more than a body of knowledge. It is the methodology of a CoP. Lessons learned, minutes of meeting, official project review templates and type test reports represent the routine knowledge of the organization that is made explicit. How they are leveraged after creation varies depending

on the material. In the interviews members expressed a wish to have the knowledge easily accessible through keyword search. Users should be activated to contribute in order to make this repository evolving and of value. On production floor work instructions, quality manual, processes, inspection records etc. represent well accessible explicit material.

Wiki, discussion forum, some accounts and some such were proposed to relay routine knowledge.

4.1.6 Company culture, meetings in the case company

Mostly there are two types of meetings. Ones aiming to fulfil process needs (quality system, project review) and ones for specific needs (design, sourcing and sales) inside a discipline. Most of the meetings are based on process requirements and are informative in nature. The expert does his job and reports in the meeting about the progress e.g. project status. He can also point out the problems needing a solution and requirements for resource allocation.

Team communication can be described as reactive and problem-solving oriented. When e.g. a design challenge is met the team member takes it up in a weekly meeting or contacts a colleague to proceed with his work. Proactive and reflective approaches are not very common.

Handy's observation provided evidence that when seeking for answers, it is five times more likely that people turn to friends or colleagues than consulting written instructions (Handy in Koskinen& Vanharanta, 2002, 59). Thus who you know significantly affects what you know.

One reason for the lack of reflective and development oriented communication can be that people are too overloaded to do that. On the other hand seeing problems up front with the help of tacit knowledge from experienced workers could actually make the time spent worthwhile.

Another reason could be that development and improvement is not in everyone`s mind a part of the job description. There is a clear need for a forum or an attitude change to help facilitate innovation on all organizational levels. Face to face interaction is seen also indispensable in sharing tacit knowledge and good for the unofficial organizational culture (Nonaka& Takeuchi 1995). Lämsä and Hautala (2004,194) say that it is important to create a supportive atmosphere in the work place where tacit knowledge can be transferred. Learning that occurs between junior and senior employees increases competencies and releases individual tacit knowledge for the use of the whole organization (Ilmarinen et al, 2003, 29-31).

By sharing experiences in projects, good and bad, tacit knowledge is relayed without noticing. In a reactive corporate culture you don`t get any answers without asking. It is like passing the ketchup. You never get it without asking for it. This is supported by findings of Virtainlahti (2009, 110). One positive observation in the organization towards sharing is having a lessons learned

section in the project final review. This part should be more conversational and include the good and the bad lessons objectively and accepting them as they occurred.

4.2 Peripheral view

The case company is in a way a typical Finnish manufacturing company that has already become internationally established and is competent in terms of direct sales efforts. In order to evaluate its peripheral view condition, having worked in the company for nearly 10 years an evaluation was made by means of observation (Korhonen 2014) based on the Harvard business review Peripheral vision scoring tool Figure XXVI below. It was not in the scope to have the whole management team to evaluate this together or the division employees on all levels of the organization either. This might be a good avenue though to continue to analyse how the vision is shared on a larger sample taken.

Most managers think they have a good handle on the realities of the business and markets, but they are usually focused on their current customer base and especially the high volume ones, rather that the larger pool of potential customers. By focusing only on direct existing customers and rivals a company may miss the weak signals on emerging technologies or new players that are less immediate threats on the periphery. This sort of systemic myopia may lead to exposing your company`s customers to low-end competitors. If the company then in turn retreats from certain product segments it leads to lower capacity utilization, dropping profits, increased unit costs and makes the company even more vulnerable to low end competition.

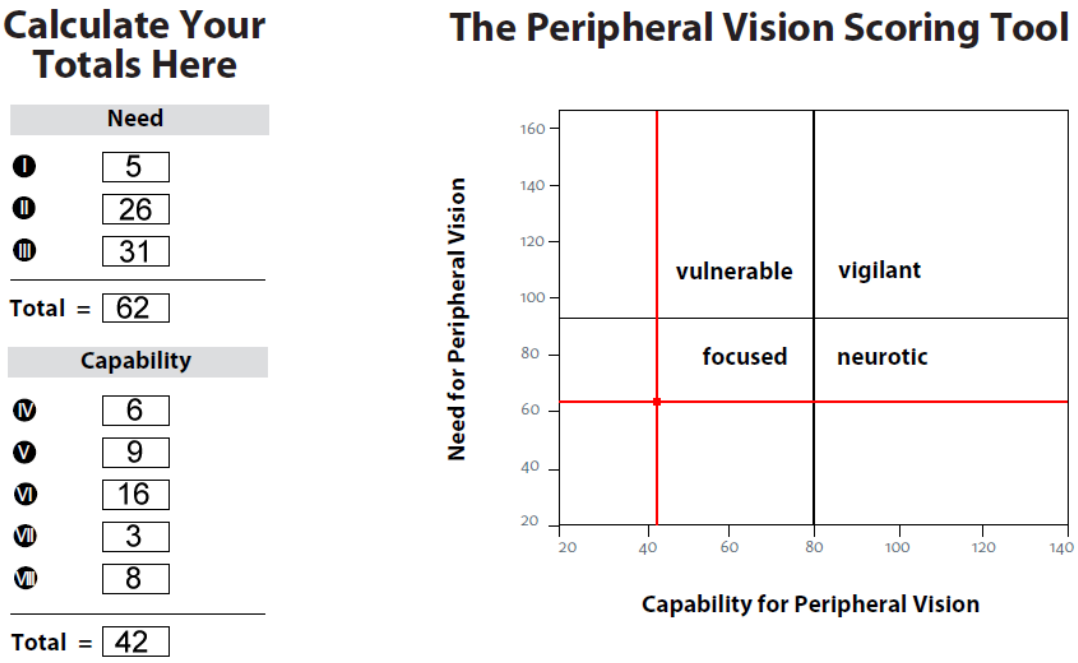

Fig. XXVI. The peripheral vision scoring tool (Day& Schoemaker 2005, 8) applied by Korhonen (2014)

Based on the scoring result the company is in a business that is moving slowly in terms of technology and innovation but is strongly protected from new market entrants by many regulations and the need for specific expertise in product architecture at the moment. If the environment was to change by e.g. 60 points in the needs axis that would place the company right in the vulnerability zone if no action is taken in capabilities to scan the periphery. Weak signals are there and emergence of a signal that smaller companies are joining forces to offer larger scopes of delivery allowing them to package their product offering in a way that would make competition difficult for those companies that cannot offer the same product range.

There is much to be learned from customers that complain and those who defect. Both groups express albeit in different ways their discontent in needs met. How to identify the important signals? A good way is to pick one and amplify it or fast forward it to the future of your choice by means of scenario planning. It is not practical to assess each weak signal but to management should entertain the possibility that they might be missing some and seek insight from those around in the organization. By reflection together an insight may be reached which signals require more attention and which can be left waiting for amplification or discarded. Attention should also be placed on what signals were missed in the past and where was the blind spot. What is happening in those areas now?

In evolutionary economics key assumption is that companies differ in terms of their innovation behaviour. According to this theory, firms in the same environment might adopt different strategies provided their environment is complex enough. Fundamental drivers behind so called Schumpeterian regimes are the sources of information. When information is unevenly available opportunities for innovation depend on the position of firms in the industry landscape. Effects brought by clustering innovation may be so strong that it can sustain economic growth for a long time. (adapted from Kaivo-oja 2006, 13)

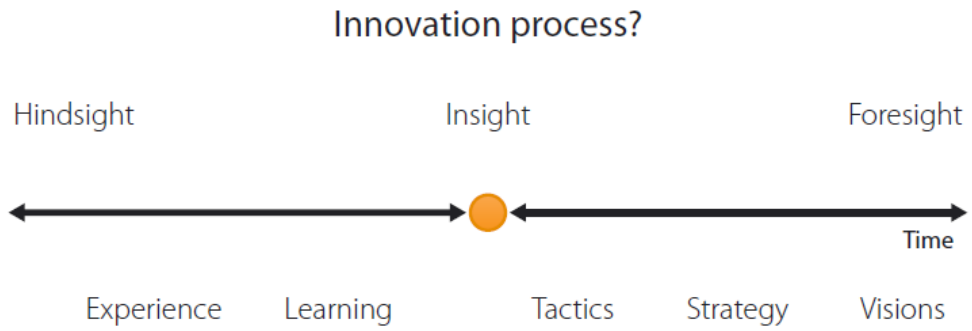

Fig. XXVII. Time frames;hindsight, insight and foresight in an innovation process (adapted from Kaivo-oja 2006, 29)

In this thesis the research has covered the hindsight aspect in the form of tacit knowledge and capturing the lessons learned in the figure XXVII above. Weak signals chapter cover the foresight part albeit in a supporting role from knowledge creation point of view. Tactics and strategy are not a subject here but a vital part of the process and either at the root of the scenario or as the target of it depending on the lifecycle phase of the company. The case Company Ltd is in a stabile business with strong barriers to new entrants but at a constant threat to low-spec threats from the emerging markets. Therefore it is vital to more and more include the foresight into the insight creation in developing the strategy further to prepare for any shifts in the market place.

This brings us to the big picture of this thesis. By managing, facilitating and nurturing the movement of knowledge in the complete time spectrum from hindsight to foresight a company can benefit from all the knowledge available to feed the innovation funnel with diverse ideas for the future that are refined by lessons learned from the past in the applicable context of the business. The research seems to indicate a strong contribution from an agile, flexible and inquisitive company culture coupled with knowledge systems that allow detecting and sharing weak signals and organizational configuration that encourages the exploration of the periphery to yield best results for knowledge inflow and retaining.

Once you find the dots it is easier to connect them.

4.2.1 How to organize for scanning the periphery

"Chance favours the prepared mind" - Louis Pasteur

There is no need for overextending in scanning the periphery. Companies in relatively stable market and simple environment have less of a need for it. But a fair warning in the words of Charles Darwin: "*It`s not the strongest of the species who survive, nor the most intelligent, but the ones most responsive to change*."

Corporate development is the natural place where the overall responsibility should lie for weak signals scanning. In SME`s the challenge often is lack of capacity for corporate support functions like that. Therefore you must delegate the signal searching to a wider base and take the task of filtering and analysing it in a group setting.

When an organization has a wide customer interface from sales, design, project management, validation and after sales, the organisation gets a lot of valuable information on how the customer expects the organization to behave and act. By gathering this data and acting in accordance with those wishes an organization may create a competitive advantage over other companies and deepen the customer relationship and generate customer satisfaction beyond product based satisfaction. Weak signals used in Customer knowledge management (CKM) include acquisition, management and exchange of customer knowledge inside an organization.

Every worker doing customer visits for whatever reason should be trained to observe and pose questions in a way that benefits signals capture. Reporting back to corporate development will be the forum for signals amplification and reflections in the management team is the socialization of weak signals that are tacit in nature.

In the figure XXVIII Futures radar below (Korhonen 2014), I propose a working model that could be a basis for an effective weak signals capture and futures anticipation framework for the case company. This model places a firm in the epicentre of the SECI-model and encompasses the organizational learning, weak signals capture and facilitates tacit knowledge emergence in the organization. It includes the discipline in the organization wherein the activity takes place. Through the cycle of information gathering, internalization and socialization the organization is implanted in a learning loop that is driven by strategy. That is the case if the company is in a development phase where strategy drives the tactics and actions. If the company is in a phase where strategy needs rework then the input to it can come from the process.

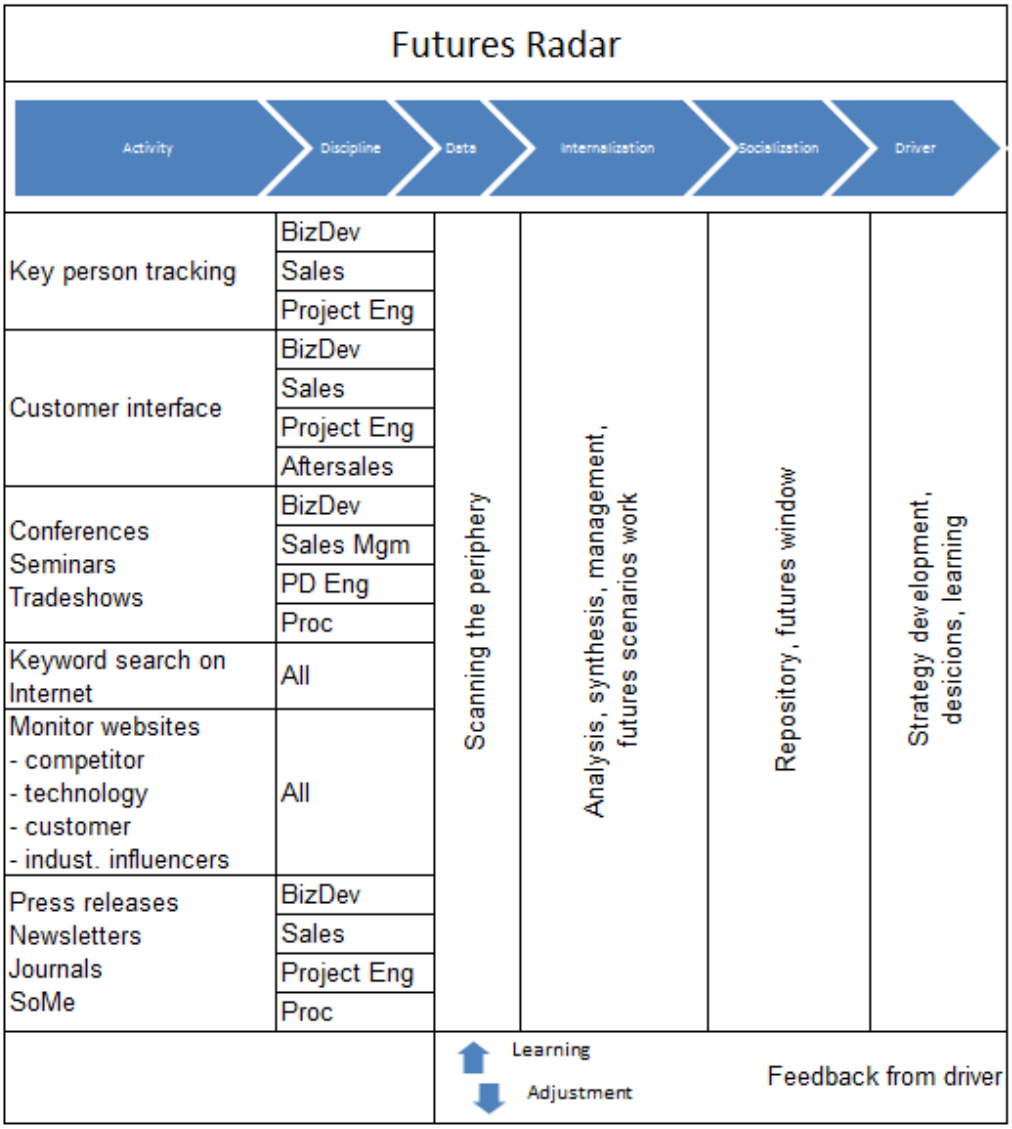

Fig. XXVIII. Futures radar with a learning loop (Korhonen 2014)

A qualitative method to prioritize risk is to use an impact matrix. By charting uncertainty on one axis and impact on another there is a useful tool to make sense of a situation when many different scenarios are involved. There is no need to monitor a risky event that is certain to occur or events that have a low impact on business. Instead a company should prepare for them automatically. Those scenarios that fall into the upper right side quadrant are the ones that early warning system should monitor. According to Gilad (Gilad 2003, 83) any change driver that significantly impacts Porter five forces fields should be ranked at a high impact periphery of the matrix XXIX below.

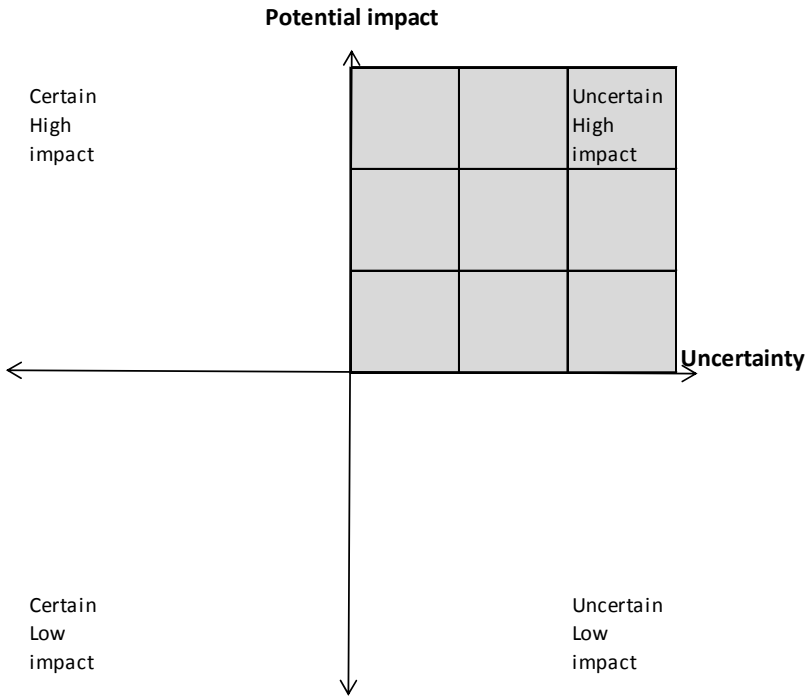

Fig. XXIX. Impact matrix for change drivers in uncertainty (adapted from Gilad, 2003, 82)

4.3 Learning process

Sharing knowledge makes the knowledge visible also to the person himself. Opening up the level of your own knowledge helps develop it further. Shared knowledge improves the knowledge base of the organization members and improves the organizations ability to uphold and develop its functions in the future (Virtainlahti 2009, 107-108).

Below there is a table 12 of a learning organization adapted from Otala (2008, 75-215) and it is mirrored against one practical case of a product development activity from the case Company Ltd.

1. The need to learn comes from what needs to be achieved or improved and the learning it requires
2. For the company to function in a new way and to renew itself it needs information from research or from external sources. The organization however does not learn anything but the persons acquire and adapt the new knowledge in a way that is most natural to them personally. Companies often leave it to this and once learning need is

acknowledged a course is ordered and case is closed. This is not enough if you want to change the way the organization functions

3. Person himself has to first embody the new knowledge for it to become a capability to leverage. It requires reflection, putting into practice or discussing it with a colleague or in some interaction generally. That takes time that people often don`t have.
4. Sharing the knowledge in the company processes creates common knowledge or combination as it is said in the SECI-model.
5. Creating a common vision is important when people bring in new knowledge from different sources and represent different viewpoints. What is relevant in the new knowledge and how should it be applied in our case. After a common vision is reached the newly internalized knowledge should be applied into practice. If a common vision is not reached every actor can apply the knowledge as they see fit.
6. Application occurs in work activities. Once applied and made explicit it becomes a part of company`s structural capital
7. Sharing experiences and lessons learned is the step where actually new knowledge is emerging. The more people share their experiences the more learning occurs. This can be done formally, informally but important is to reflect and evaluate one`s actions and changes in behaviour in light of the new knowledge.
8. As a result one can conclude if common behaviour has changed and how. Conclusions should also indicate what additional learning is required. Actual return on time spent comes from the results in how the company works better by its own standards or KPI`s.

Table 12. Learning organization (Adapted from Otala 2008, 75-215)

	Learning organization		Agent	Example from organization
	Need for skills, current state		Need for change	Need to create a new door wirth fire integrity class EI30
1	Acquiring the required knowledge	Individual learning	Training Courses Self study Books Articles Reports Internet SoMe E-learning Knowledge services Research	Studying and researching to model the structure Selecting materials Testing the structure in test environment
2	Understanding and internalizing the knowledge		Personal coaching Learning at work Simulation Blog, Wiki Time and room for reflection	Test fails Studying the video material for possible root cause Improving the structure
3	Sharing the knowledge in the work place	Organizational learning	Meetings Forums Presentations Expert network SoMe, Wiki Intranet CompanyTV/magazine	Sharing the root cause analysis in expert network Experts agree on the remedy
4	Creating a common vision		Communal knowledge creation processes Modelling Learning Café	Running a meeting to create common vision
5	Application into practice		Doing Projects Protos Simulation Learning at work Continuous improvement Quality work PBL(Problem based learning)	Redoing the test with success Sharing the solution in expert network
6	Sharing the experiences		Meetings Forums SoMe, Wiki Storytelling Sharing best practices Benchmarking Lessons learned	Product into a library model Documentation
7	Conclusions, desicions, learning, results		Comparing experiences to starting point Comparing results to goals Identifying additional needs for learning	Time&Money analysis Does the product meet customer expectation Redesign to cost?

That is an example of a case where senior expertise was used in a positive way retrospectively. My question would be how it was used before the failed test to succeed in the first test. Did the junior seek enough peer advice from a senior before the first test was made.

Observations from weekly meetings and group work lead to believe that organizational learning is a complex process and colored by tensions. The properties of learning as a process and the

learners are complex and their impact in learning process remarkable. What company management should hope for is to absorb the lessons learned and adapt it into new knowledge in an innovative way that facilitates learning. The tensions in the process are not only a hindrance but offer the company a possibility to develop but that requires accepting the tensions and not trying to eliminate or ignore them.

Managers may also tend to judge the value of tacit knowledge by assessing individual`s abilities to communicate some of the tacit dimensions to their knowledge-through prototyping, drawing, demonstrating expressing ideas through metaphors and analogies, or mentoring in general.

To adjust the attitude of the people involved you need functions and or tools and arenas to share knowledge but more importantly reflect on it and create a common vision horizontally and vertically. Peng and Akutsu (2001, 122) suggest that mentality is a major factor in understanding people`s attitudes and behavior towards new ideas and new knowledge in general because of the changing contradictory and contextual nature of any new knowledge. A dialectical mentality may facilitate a more receptive stance than would a linear mentality when dealing with new ideas that are contradictory, ambiguous or uncertain Peng and Akutsu continue.

Nonaka (1991) emphasises that the sharing of tacit knowledge takes place through joint activities and requires physical proximity. He also states that in order for others to understand it tacit knowledge must first be externalised. Proximity may have a positive effect on tacit knowledge dissemination (Koskinen 2003, 73).

There are four key challenges in building these communities. The technical challenge is to design human and information systems that not only make information available, but help community members think together. The social challenge is to develop communities that share knowledge and still maintain enough diversity of thought to encourage thinking rather than sophisticated copying. The management challenge is to create environment that truly values sharing knowledge. The personal challenge is to be open to the ideas of others, willing to share ideas and maintain a thirst for new knowledge. (McDermott 1999, 116)

Knowledge champions are people who could be designated to systematize the knowledge yielded in projects. It would seem that in order to manage learning you need to manage capability, flow of information and interaction. Parts of those tasks are placed on managers but knowledge created may not be managed to its full extent.

4.3.1 Real versus fake teamwork

Doing it the old way, plans and decisions are made by the project manager and requirement analysis are done by sales backed up by technical support. What can the team do? Do we have

the product or do we need to develop it? The sales interprets that there is no time or resource and the team can only do implementation like tailoring an existing product to customer needs, such as low-level design, coding and testing. Tasks are assigned without full involvement of the team. It is a separation of knowing and doing. Under such a way of working, people can't see the big picture, have less opportunity for personal development, and can't feel achievement and growth. They aren't engaged or committed. It is just another task to be performed without room for creativity.

When using agile methods the plan is made by the team. Decisions are made by the team. The project manager, which in agile terminology is Scrum Master, is only a facilitator. The project manager can only define what to do. The team has the authority to decide how to do it. That is unity of knowing and doing where the team potential is fully released. They can see the big picture, they are more motivated and can volunteer for tasks that interest them which facilitates personal development and they can feel a sense of achievement from their day-to-day decision making and implementation. After some time of working in this way, the team becomes proactive and synergized. Like a real team instead of individuals allocated on tasks.

Polanyi also had an opinion on going too deep into details. His examples were from more physical activities but one could apply them in my opinion to problem solving as well. "*Scrutinize closely the particulars of a complex entity and its meaning is effaced, our conception of the entity is destroyed by unbridled lucidity"* (adapted from Polanyi 1966, 18).

The most important aspect of learning in a demanding work setting is that it is very interactive. Experts cross pollinate in order to find a solution that is feasible. In fact the problems that you are working on are so complex that they are not appropriate to try to solve alone. Organizations that can benefit from the staff's collective cognitive effort will be able to find better solutions and respond to changes more quickly.

4.4 The way forward

Social capital include the personal relationships that bind together members of an organization as well as relationships that link organizational members to other external sources of human capital. Social capital isn't a marketing keyword a business strategy a work process or a substitute for any of them. It is not always even a good thing. Some companies, even cultures I suspect, may have been damaged by high social capital that breeds what is often referred to as groupthink – a tendency not to question shared beliefs. A strong identification with a group sometimes leads people to support ideas that are narrow or wrong. Too much warm, fuzzy intimacy can prevent people from challenging one another with tough questions or discourage them from engaging in the creative friction that can be the source of innovation.

Surprisingly many knowledge management initiatives seem to consider knowledge as an object. It is easy to do that if you are looking at it from an IT-system perspective. That will lead into thinking that knowledge, equated with information access, is viewed as a element to be stored and manipulated. There is use for that thinking in certain types of knowledge that is not subject to change too rapidly that the 'data object' in this case does not become obsolete and therefore useless. The way to work would then be to focus on gathering, storing and transferring knowledge and making it accessible. This is what the researcher would propose to be done with the knowledge that is usually on the intranet or some similar repository like e.g. design rules Wiki. Sharing procedural knowledge on a need-to-know basis; organizing information into enterprise knowledge-propagation systems; proactive enterprise knowledge-sharing systems; and institutionalized knowledge-sharing is a fragmented and low maturity knowledge management initiative that can only be recommended for low level instructions and basic CRM functions in the case of Company Ltd.

In the case of Company Ltd the view is more like knowledge as a process. That envelops the concept that the knowledge is a process of simultaneously knowing and acting as in applying expertise. That is to be done in a group setting allowing tacit knowledge to seep into the decision making process. Methodologically knowledge management initiative then focuses on links among sources of knowledge to create wider breadth and depth of knowledge flows – transparency. This approach could be applied into managing product development, innovation, customer relationship management and management in general. For example innovative product detail design can never truly draw from a data object repository for other that "don`t try this" type of evaluations.

Considering knowledge as a capability sees the individual with the potential for influencing future action by applying information, learning and experience that result in an ability to interpret information. This is increasingly important attribute in working life today. Well rounded cognitive skills and media literacy bring good results i.e. in product development but by leveraging tacit knowledge you are able to ascertain what information is necessary in decision making. In this setting knowledge management focuses on enhancing intellectual capital by supporting development of individual and organisational competencies. This approach could be applied into development of professional skills like using the latest tools and software and training people in how to best utilize them. On a company level people are often trained in management or lean manufacturing or e.g. how to manage with machine directive requirements. Mentoring and coaching could be considered belonging into this classification.

During this thesis process, the researcher has become more and more convinced that free flows of knowledge among knowledge brokers organised as boundary-less, fluid and ad hoc communities of practice (centres of excellence) is the way forward for this case Company Ltd. Focus on creation of learning organisation through combining tacit and explicit knowledge

(synergies of knowledge) facilitates direct lateral knowledge flows between internal knowledge brokers. It brings about competitive advantage not only through the fact that is difficult to imitate by competitors but by joining people for a greater cause by welcoming ideas over boundaries.

Making tacit knowledge explicit and futures weak signals usable should involve iterative rounds of open reflection, networking, and discussion leading to the ownership of strategy with the aim of exploiting opportunities opened up. Listening is not just hearing to entertain other views, especially opposing ones.

Knowledge is not shared as content because it is always comes in a framework of experience, individual filters and personal reference. Knowledge is created in interaction of individuals that together learn the way of solving challenges that working life brings. This is a continuous process that requires communication and coordination. The point is often missed by managers that are task oriented and fall in the pit of ticking the boxes – task completed. Tacit knowledge is not shared but in a team like environment an opportunity to learn together is established and organization learns how to learn and how to solve problems collectively. So in a way capability is not a property of an individual but more an attribute of team communication.

To leverage knowledge in the case company

Develop and nurture communities, formal and informal

- Focus on knowledge important to both business and people
- Create forum for thinking as well as for sharing
- Let the community decide on how and what to share
- Use the community`s terms for organizing and making knowledge explicit
- Integrate sharing into the natural work process

Proposals on how to facilitate the emergence of tacit knowledge

- Knowledge management and capability management should be in direct link with business strategy
- You have to manage it on all levels to make it happen
- Capability management on personal level and knowledge management on organizational level
- Transferring tacit knowledge may not be possible but facilitating its emergence should be planned to be bi-directional
- When people begin to know and trust each other knowledge is shared more readily

Table 13. SWOT on tacit to tacit Socialization (Korhonen 2014)

Strengths	**Weaknesses**
• complex problem solving is possible • no major investments on IT • increase of profits • possibility to misunderstanding with different frame of reference when knowledge is transferred person to person	• knowledge transfer takes time • meetings between several people cost • person of experience can be used for only 1 task at a time
Opportunities	**Threats**
• innovation • by building a contributing culture people are inspired to improved performance • connections over organizational boundaries create synergies • Efficient use of lessons learned	• if corporate culture does not support the strategy, transfer will never be efficient • knowledge will walk out the door with the person without a database storage • imperfect databases on peoples capabilities do not allow efficient search of knowledge

Jishuken (自主研)

Jishuken is a management driven kaizen activity where management members identify areas in need of continuous improvement and spread information through the organization to stimulate kaizen activity.

Proposal for leadership to improve learning in the case company

Leadership consists of opposing strengths, and most leaders have a natural tendency to overdevelop one at the expense of its counterpart. The resulting imbalance diminishes their effectiveness. But leaders who work to guard against such imbalance can increase their versatility and their impact.

The notion that inadequate performance results from underdoing any of the requisite skills — delegating, giving direction, communicating, cooperating with peers and so forth — is well established. Perhaps the focus on overdoing hasn't been as sharp because its problematic

aspects are not immediately obvious. One of the most common patterns in leadership is an overbalance toward being forceful and away from being enabling.

The lack of balance in leadership, which is linked to the idea of overdoing and is well known to individual managers, has also not fully registered in the practice of management. When presented with two opposing approaches, people in general have a tendency to polarize, placing a high value on the approach in which they have greater faith and competence while overlooking or demeaning the value of the other. They may be too task-oriented and not sufficiently people-oriented, too tough and not responsive enough to people's needs, too big-picture-oriented with not enough emphasis on planning and follow-through.

In their research Kaplan and Kaiser (Kaplan& Kaiser, 2003) have found it useful to think that in order to be a balanced leader one should be able to draw freely from two opposing sides as appropriate for a given situation. Two opposing sides in this case would be the leadership qualities you usually find leader inclined to that are the balance between forceful leadership and enabling leadership and the balance between strategic leadership and operational leadership.

Versatility - which is the absence of imbalance - is also most usefully defined in terms of pairs of opposing qualities and skills. Versatile leaders are able to continually adjust their behaviour, managing to apply the right approach, to the right degree, for the circumstances at hand.

In the figure XXX below there are some properties attached to each leadership style. It is easy to imagine which type of leadership is cultivating more organizational learning and open networking of experts.

FORCEFUL LEADERSHIP ⟷ ENABLING LEADERSHIP			
Vice	**Virtue**	**Virtue**	**Vice**
Dominant to the point of eclipsing subordinates	Takes charge; in control	Empowers subordinates; able to delegate	Abdicates responsibility for oversight
Doesn't hear and value others' opinions	Takes stands and articulates them clearly	Listens to others' opinions and ideas	Takes no clear stands
Insensitive; callous	Makes tough calls, including those that have adverse effects on people	Compassionate; responsive to others' needs and feelings	Overly accommodating
Rigid; demoralizes others	Holds others accountable	Understanding	Doesn't hold others accountable
STRATEGIC LEADERSHIP ⟷ OPERATIONAL LEADERSHIP			
Vice	**Virtue**	**Virtue**	**Vice**
Looks down the road too much	Focused on setting long-term strategy	Focused on getting short-term results	Myopic; has tunnel vision
Hopelessly conceptual	Thinks broadly; focused on big picture	Knows the specifics of how things work	Bogged down in detail
Too ambitious	Expansive; aggressive about growing the business	Respects the limits of the organization's capacity	Too conservative and limiting

Fig. XXX. The virtues and vices of leadership styles (Kaplan& Kaiser 2003)

Proposal for leadership to improve reading future signs in the case company

More than ever, company leaders must develop their peripheral vision, scanning for faint - but vital - signals that will help them give their companies a competitive advantage. The words no board or investor wants to hear about a company's leaders are "they ignored the warning signs". On the positive side, vigilant leaders can spot opportunities and threats before rivals. Boards don't expect the ability to know what will or might happen in the future, but they do rely on the leadership team to sense and act on early warning signs of trouble, or opportunity.

Day and Schoemaker (Day& Schoemaker, 2008) made a survey and data was collected from senior managers in 119 global companies to examine their need and capacity for peripheral vision. The second part of the survey focused on the organization's overall capacity for vigilance in terms of five components: (1) leadership orientation, (2) knowledge management, (3) approach to strategy formulation, (4) organizational design or configuration and (5) organizational climate and culture.

While the importance of vigilance has been recognized by some leaders, practicing vigilance is all too rare. In their study, only 23% of companies had leaders with a vigilant and curious attitude toward the periphery. One reason for a lack of vigilance among leaders is their focus on operational execution. Three primary qualities distinguish vigilant leaders from those striving primarily for operational excellence. A vigilant leader focuses externally and stays open to

diverse perspectives, applies strategic foresight and probes deeply for second-order effects and encourages others to explore widely by creating a culture of discovery. In contrast, operationally focused leaders concentrate on the task at hand, engage in traditional strategic planning and budgeting and encourage a culture of superb execution. In the table below there are some qualities of vigilant and operational leaders. Most leaders act at various points along the continuum between the extremes listed in the figure XXXI below.

	Vigilant Leaders	Operational Leaders
Focus	External, active and curious	Internal, narrow and focused
Market Orientation	Outside-in	Inside-out
Scanning/ Listening to Others	Open Seeks diverse perspectives Listens to a wide array of sources	Very focused Limited interest in outliers
Networking	Broad social and professional networks	Limits networks to familiar and relevant settings
Strategic Orientation	Strategic foresight Imaginative Probes for second-order effects Good instincts	Predictable thinker Focused on task at hand Tied to past experience
Attitude Toward Uncertainty	Embracing Navigating	Avoiding Controlling
Willingness to Challenge Assumptions	Open to new thinking Learns from experiments	More defensive Sees failure as errors
Time Horizon	Long-term	Short-term
Enabling Exploration	Enabler Coach Visionary Creates slack for exploration of the periphery	Controller Emphasis on efficiency Permits little slack

Fig. XXXI. Distinguishing vigilant from operational leaders (Day& Schoemaker, 2008)

Fig. XXXII. Increasing your vigilance (Day& Schoemaker, 2008)

In the figure XXXII above there are some specific steps leaders can take to heighten their own vigilance and that of their organizations.

5 NEED TO STUDY FURTHER

This thesis represents a learning curve for the case Company Ltd and answers many questions. It also opens up new avenues for further research. If knowledge management and weak signals scanning are the next steps for the organization then practical day-to-day questions will be presented. How should the company proceed with defining the knowledge that is to be made explicit and what practices should it apply in creating the Ba for sharing tacit knowledge? Do other companies share the same challenges? How could the company use social media tools for knowledge management (Instant messenger, Wiki, Blog, Expertise matrix with contact details)? Tools for sharing tacit knowledge by not making it explicit: Orientation, occupational guidance, performance/development appraisal, courses, meeting practices, informal gatherings like coffee breaks, benchmarking, job rotation.

On the divisional level the Company Ltd could start identifying, defining, measuring and evaluating intangible assets.

Intangible capital is the company`s intangible resources that it can leverage in business context. The value is defined by their importance, use and value in daily operations. Therefore it is crucial to see different resources in their use and the different ways the company uses, acquires and aims to increase the value of them. Products and services are born mainly out of intangible capital and turnover and customer satisfaction indirectly measures the return on intellectual capital performance. When managing intellectual capital performance a company can determine how well the assets are leveraged.

Resource	→	**Action**	→	**Result**	→	**€**
Human capital		Innovation process		Knowledge and capabilities		
substance capability		Customer process		Brand and customer		
business capability		Functional process		Innovation and immaterial rights		
production process capability				Process efficiency and quality		
customer and partnering capability				Stakeholder satisfaction		
organizational capability						
Structural capital						
business processes						
product innovation						
brand						
structures and systems						

Fig. XXXIII. Intangible capital identification and definition (adapted from IC-partners 2004, 11)

One feasible research path could be the link between organizational capabilities through different processes into customer perceived value as per the figure XXXIII above.

6 SUMMARY

There is a clear indication that learning is important now and in the future. While writing the final chapters of this thesis I came across a piece of news that Google reportedly (Gannez 2014) paid as much as 400 million Dollars to acquire DeepMind Technologies, a startup based in London that had one of the biggest concentrations of researchers anywhere working on deep learning, a relatively new field of artificial intelligence research that aims to achieve tasks like recognizing faces in video or words in human speech.

Transferring tacit knowledge is strongly affected by the attitudes in the working place. General appreciation for aging workforce is declining. Wide life experience and range of skills are needed and we cannot afford to throw away the lessons learned and the knowledge it represents. It is important to realize that the ageing workers are not just a part of the history of the organization but very much a part of building the future as well. Transferring tacit knowledge requires interaction and cooperation between people – the thing we have less and less time for. Why is it so that is it more efficient to work on a problem alone when there is help available in the form of experience in the next cubicle? I am with Nonaka when he criticizes western organizational thoughts that have static mental models. It is reflected in the emphasis on quantitative data ahead of the qualitative. Indicators for activity (e.g. ROI, expenditure, efficiency) produce only a rear mirror view. They do not make way for alternative futures.

Interestingly I started to see the thesis process in a SECI-model shape. The figure XXXIV below describes the phases of the thesis representing SECI-model steps.

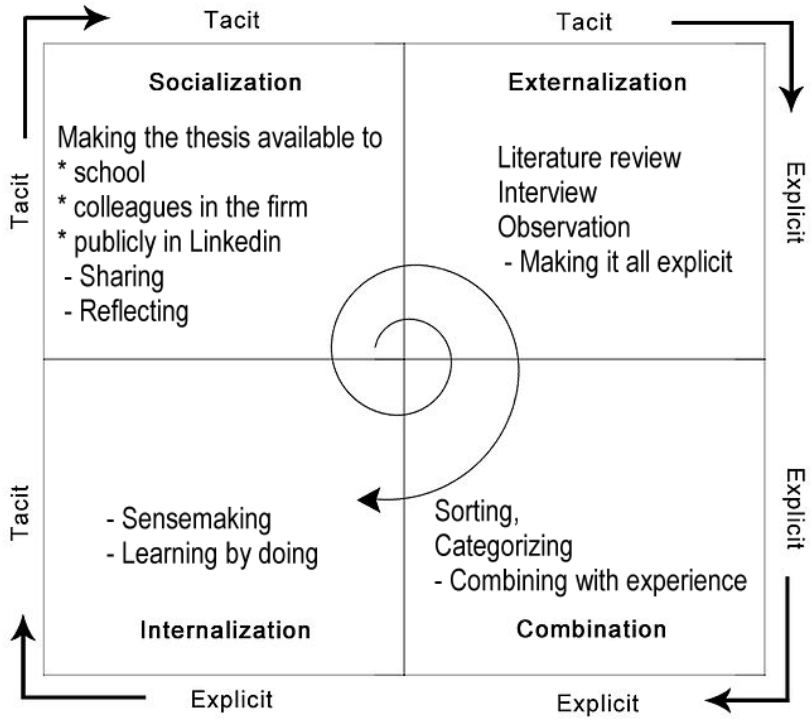

Fig. XXXIV. MBA Thesis as a SECI-model process (Korhonen 2014)

Capable and committed work force is a competitive factor to the economy and society and a key to national competitiveness. Capability management and learning organizations are the prerequisite to success. The general development of aging in the prospering countries intensifies the competition for capable labor force globally. People are more willing to relocate for work than ever for the right challenges and a learning culture. Changes in age structure require that incentives and work-life reconciliation takes into account seniority as a resource and not as a burden on state and company level alike. When capability is seen as application of person's skills and capabilities at work then it involves a person's motivation and ability to work. Capability must be managed and developed on the long term seen from the company and personal objectives. It touches everything in the realm of HR-management, strategy, personnel planning, recruitment and daily leadership and management. It is all about open communication. The results will come in the shape of customer satisfaction and quality of service. One simple tool in the daily life of the firm is performance review. Much more emphasis should be put on its proper use as an organizational and personal development tool.

To summarize there is one sentence that encompasses all that …

Creating learning connections is more valuable than creating learning content (Kilpi, 2014).

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World Economic Forum (2011) Global Talent Risk – Seven Responses, Referred to 17.2.2014 Available on the web at http://www3.weforum.org/docs/PS_WEF_GlobalTalentRisk_Report_2011.pdf

Interviews

[1], Interview 16.5.2013, 49 hits Company Ltd

[2], Interview 8.5.2013, 39 hits Company Ltd

[3], Interview 16.5.2013, 68 hits Company Ltd

[4], Interview 7.5.2013, 30 hits Company Ltd

[5], Interview 7.5.2013, 47 hits Company Ltd

[6], Interview 22.5.2013, 48 hits Company Ltd

[7], Interview 16.5.2013, 35 hits Company Ltd

Interview questions

Background data:

1. What is your age?
2. How many years have you worked for the company? Career path inside the company?
3. What is your highest level of education?

Soft landing / warm-up:

4. Tell me about your current job?
5. How did you learn it?

Interview:

6. What in your opinion drives our product development the most? By driving I mean where does the input for incremental product development or radical innovation come from (internal, external, planned or AdHoc)
7. What is your view on how a beginner becomes an expert in this organization? How do you understand the term tacit knowledge? (If totally on the wrong track explain the concept)
8. Do you think it is a valuable resource for the company (motivation to share it?)
9. What tacit knowledge do you think you have from your customer encounters?
10. What do you think are the most important aspects in being successful in this role?

11. What is your view on the importance of making tacit data explicit to support organizational learning?
12. Would you be ready to participate in the process?
13. Would you be willing to utilize that information?
14. What would be the ideal format of that type of information?
15. What would you expect/want from a senior/junior member of the staff?

Actions after the interviews

I. Transcribe the text
II. Read them again
III. Collect the key concepts and key words that came up
IV. Analyse the tacit nature of the knowledge with reference to expertise development and weak signals from customer encounters

Interview full table of notes, senior interviewees

Sentence used	Concept or key word	Policy
What`s wrong with this picture: A lot of the projects are being managed in a very elementary level [1] We need a corporate culture change [1] We have so different needs as the rest of the group of companies and we are too small [1] In the beginning of the business the project manager did all of the documentation too… now you need at least a working pair like PM+ designer [2] The time you do documentation is away from project management tasks [2] You`re always on the limit with the resources so any help is good weather it is for project management or design activities [2] Travel reports also from other trips than service trips would be good[2] There are no real meetings to figure out what we should do and how we should do it [3] Only the necessary information is told [3] Sometimes it is really frustrating when you have told people to avoid a certain mistake and they have done it anyway and then you have to go and fix that problem [3] After sales will be least burdened when they have the possibility to review the design in development phase so invitation to a design review is very important [3] Five heads is always better than one [3] Sometimes the given information just does no stick [3] We should think about the document templates together [3] Now anyone can walk over important agreed checkpoints by personal opinion when it used to be impossible and required a meeting where the experience was brought in [3] Every project seems to come into production to quickly and with too short lead time [3] The customers are complaining if we promise the deliveries too soon and cannot deliver [3] The company is in a small city far from services and entertainment so it is not easy to attract competent workforce and keep them [1] Why do we have to send all the money to Sweden, why don`t we use the “extras” into developing our own activities [1] The further you go south the more title you need to get to talk to the right people [4] If the negotiation counterpart is older you need to be older as well to be credible [4]	Decision making maturity Corporate culture Resource always limited Communication Cooperation Making tacit knowledge explicit by documenting some key things on a base template Process discipline Getting and keeping the talent Developing ourselves/investing Seniority counts in the customer cultures	Internal and external reasons Work alone but bigger issues decided together ⇨ Sharing knowledge ⇨ Travel reporting ⇨ No long term visibility ⇨ Need more “real” communication ⇨ Talent management plan
How we work together: Maybe it is the growing pain of the company [1] Mentality of the company is not disciplined enough, people do not utilize lessons learned [1] You have to do everything yourself [1] There is no leadership to show the guidelines [1] You have to be honest to yourself [1] The laziness to repeat the mistakes should overcome the laziness not to find out the right solution [1] Some people are just so clever and all-knowing straight from school and it seems internet is a better tool than the 15-20 year veteran in that discipline [1] You should find out enough not to do the same job 3 times e.g. in making delivery papers [1] Managing the tasks and their priorities [2] You remember the requests from the customer but keep them in their right priority [2] You tend to over or underestimate the importance of individual requests if there is no experience [2] Asking from the senior has vanished they just gallop along and repeat the mistakes [2] I guess it is how the world is today, education plays some part in it but the hectic life of today grows us to be this way – self-confidence is good but when it makes us repeat our mistakes it is not good [2] Sign of the times is that we are always a little behind and don`t have time to go through lessons learned... we`ve always had 90% resources in relation to the need [2] Easily you go in sales with your jacket open that everybody wants your product [4] We are just quite easily the “engineer vomit” and no place for human approach [4] Young guns that already know everything they never own to the fact that they made a mistake… it is swept under the floor mat and never spoken of again [4] Decision making sucks big time because all the decisions have to be taken in the corner office and he cannot	Growing pain of the organization Attitude Willingness to learn Prioritizing Self confidence Ability to estimate Eye for the game Relentless Sign of the times Humility Human approach Active Trust Chemistry Corporate culture Fear Patience Tolerance for pressure	Responsibility to get the job done Work ethics Personal characteristics, can they be learned Is there a prototype of a project manager? ⇨ Attitude ⇨ Human touch ⇨ Humility

decide either [4] People are afraid to make decisions [4] A newcomer should be really active and ask a lot of questions, good language abilities, no wristwatch, no alcohol [4] The person doesn't trust that the job was already well done [3] Some have too much self confidence that there is never a need to ask anything [3] If a person doesn`t know and is ashamed of showing that, he will just assume and work on that, rather than admitting his ignorance on an issue [3] Typically the chemistry issues arise later and newcomers are well supported when they ask… but if you tell the same thing over and over again you may lose your temper and then the person does not like to ask again [3] If a person is active in seeking information the atmosphere is supportive [3] In some tasks you just need natural adaptability.. when the documents don`t match with the product and you cannot get any answers just have to muddle through [3] An eye for the game develops in time when you are working you just cannot have that straight from school… of course people perform different even in the first try but all of them are much better in time when you`ve already experienced it one or twice [3] You need patience and ability to withstand pressure [3] Have to be able to tell the important parts from the empty talk and find the clue [3] You have to be hardheaded and even difficult personality in this role to be able to work against your conscience to represent company interests well [3] A newcomer should be a self-starter rather than wait for the things to come in ready to his desk [3] Some people just never need to ask [3]	Self-starter	
Documentation: "Man memory" limitation nobody remembers where a document made 2 years ago is located [1] Utilizing existing parts in the system would be massively increased if a designer would be forced to create the new article number and all the details in the system [1] When I put my hand into the document pile or a place in the data folder I know that this detail can be checked here. You have to know it by heart on general level [1] Who reads all the documents we have? [1] What would be the right format when there is too much data [1] Nobody goes into the documents voluntarily [1] We have pages and pages of design instruction but people do not really read them – a new guy reads them but that`s it [2] The system does not really support us in a way that a person would learn them by documents … you don`t even find to the data source if someone doesn`t point the way [3] Some of the projects files are in personal folders and new people don`t even know that they exist [3] I suspect that from some of the first two projects the electronic data is still in the personals and available only in print in some folder [3] Superior should give a task to transfer all this od data and do nothing else until it is done [3] Some of that data might even be so obsolete that it is already useless [3] A newcomer has no way of knowing which spare part price list to use if the customer has 20 projects in the past [3] We use a lot of time in design and documentation so anything that helps that gives the best ROI [3] Improving the documentation for new projects is one way to transfer knowledge… you should not put any effort into the things that are already gone [3] Everybody should take part in developing the documents into direction that serves our purposes otherwise they will be buried into the single project [3]	Documentation management Process description Reading the documents Access to some documents Obsolete documents	Explicit knowledge available ⇨ Drawings from old projects ⇨ Too many documents ⇨ Everybody should take part in developing the documents ⇨ How to quickly learn where to find an old document someone may have made? ⇨ How to spot the tree from a forest
Sharing tacit knowledge: Keyword search would be great [1] Collecting tacit knowledge can be challenging so that it is relevant to the business [2] It easily gets buried into the system unless you can activate people into contributing into it and using from it [2] It should be a part of the normal working process or a larger meeting at some point of the project [2] In the beginning (of the business unit) we all sat in the same meeting thought about the new features and solutions together and everybody knew it the same time [2] We do not have an arrangement that when an expert goes on e.g. a test visit that he would have the apprentice with him to learn what needs to be checked and taken into consideration and what not [3] First assembly was made mandatory once but I don`t know if they are still done [3] The project and review should be the tool to capture lessons learned and develop checkpoints to take into consideration, but it is more like a mandatory ritual that focuses on wrong things that serve bureaucracy [3]	Keywords Relevancy Activate users in process Meetings are good Apprentice for critical issues Attitude towards due process	All the tools are there to share ⇨ Attitude towards why the meetings are important ⇨ Sharing made rewarding

Beginner to expert: Learning path, when the business area was spun off "I spent time in the university library to learn the basics of reliability and maintainability". Now there are courses and software`s available [1] For quality systems there was a quality system development training [1] Before that there was a ship seminar where a consultant asked a question if you have a quality system and what it means to a company [1] The way to work produces quality [1] You have to know the basics from school then by mentoring the specifics of this business [1] The job is not church, social service or school [1] If you don`t know – take a course [1] Lead auditor training available [1] The best way for a beginner to learn is to sit on someone`s knee one week at a time [1] You have to go into the discipline for a while and ask and learn [1] You should ask as much as possible if you know someone knows [1] Been to a project management course and management course [2] You get a general knowledge but the subtitles are wrong [2] The projects get not necessarily harder but include a lot more work all the time [2] Best way to expertise is through design work that become more difficult in time… you learn the product [2] Peer support worked well when the organization was smaller and everybody knew each other's work [2] Everybody learned from other`s mistakes in a smaller organization [2] As a new project manager you should familiarize yourself with some of the past ones and product knowledge to help you not go in the wrong direction and waste time… maybe you should have some time to study before the first assignment [2] In after sales the training is not so important – a general engineering mind is enough – the data is so fragmented in the system that you cannot replace experience in any way [3] You have to have done some projects to see the arch in them and then familiarize himself with the historical products [3] Best alternative would probably at this time a person from service – you cannot really take anyone on the side to learn it – in a way every project manager is the replacement person [3] You cannot really know the products really unless you have held them in your hands and been a part of it [3] There is not enough orientation [3] Experience is not valued as much as it should be [3]	Formal training gives only a base Take advantage of the seasoned experts knowledge Learning by doing Peer support Team should learn from individual mistakes No cover-ups Data fragmented in system Practical approach towards products Experience is not valued enough	Education paves the way ⇨ There should be more time ⇨ Respect for experience shows in words but not in actions ⇨ Don`t hide mistakes
Learning: The corporate culture does not promote utilizing tacit knowledge [1] All of the standards and directives are open so you just have to know where and how to look [1] Willing to participate in the process of making tacit knowledge explicit and utilizing (if it is mandatory or makes life easier) new knowledge [1] [4] [2] [3] Willing to participate in the tacit process and willing to use it "of course" [2] [3] [1] [4] You learn differently when you have been a part of the solution process against if you just see a list that this is now as standard solved like that in design [2] Search should be easy and gathering the data is a lot of work [2] You could even start documenting by stream of consciousness [2] It would be good to have a mentor (at least unofficially) for every newcomer because for each question you get some answer [2] You could gather a project managers manual because mostly the projects are similar [2] You could fix some vices that our managers have by a general book like PMBOK albeit our business is partially (documentation) so specific that you need some extras [2] Three challenges: writing, it has to be interesting, the recipient ego has to be in receptive mode [4] I am always ready to help if there is a place [4] Ideal format to utilize tacit knowledge would be a matrix and competence area of a person you could talk to when you have a challenge [4] In writing it easily becomes officialese and hard to understand [4] Mentoring is called for many times in some areas and we are already in a hurry [3] Some of the things are already transferred through document templates and processes [3]	Knowing who knows is also tacit Willingness to participate in making knowledge explicit Learning by participating Working pair for a newcomer Writing is painful for Finns Tone down the ego Competence matrix	Takes change in attitude ⇨ Working pairs ⇨ Make the threshold lower for Q&A ⇨ Competence matrix instead of skills matrix
Product development: PD is driven by shortage, when we notice there is no solution or the product does not meet requirements we do incremental innovation and reuse old solutions [1] There is no planning, budget or resources and has never been [1] Typically the customer points out the gaps in our product [1] Most of the PD needs come from our customers… we are forced in to even too big development steps in a hurry and you easily miss	Wrong product development driver No planning ahead Caught with pants in ankles To short development times	No future vision ⇨ Too little ⇨ Too late

something or miss something or make the design too robust [2] Agility is good but you more or less finish the product in the field rather than beforehand [2] You tend to develop products that fit only one customer when we should be the ones developing but our product is such a small part of the entity it is not working [2] Our customers want to have at least two alternative solutions as suppliers so they want to be in control of the development [2] Customers define what we do [4] Some of our goods are quite bulk material – anyone can do them [4] The owner is not very interested in product development [4] You would want that you have something really new to show and not tell the same story over and over again [4]We are quite reactive in looking into the needs of the customers but quite easily we divert the need towards our standards and say that "you won`t get this from us" [4] We never really do radical innovation but I think we could if there was resources for it [4] If you say NO too many times customers stop asking [4] Customer is directing our product development to the point where is seems too far taken already [3] We used to have a long term plan and idea to develop product families and specialties were highly priced [3] Are all the variants worth the effort in terms of economic outcome [3] The world is becoming more demanding but also we have let the control slip [3] We have to keep up with the requirements and find a solution to a problem that nobody else has solved yet [3] We have a lot of articles and the problems that come with them (obso, sourcing etc.) [3] DCU is one of the few products that come from our own product development [3] [1] [2] [6] [4] [5] Projects always take the resourcing priority and the focus comes from a very small channel (not a group effort) [3] We even had a project that developed a lot of information on a certain aspect and the current responsible didn`t even know that it existed and was spending a lot of time searching for materials [3] A product library of the proven in use solution serves design best [3]	Customer is king Group policy against development Losing our headway Project always prioritized over product development Young guns don`t even know what has been studied before Controlled library for serial production	⇨ Serving too few ⇨ No radical innovation just incremental
Tacit knowledge is: There is no system that can model a human brain or transfer ones thought to another [1] Is not told to all personnel and not generally available but based on facts [2] => Corrected for coherence in the remaining interview You`re able to estimate better the whole work scope and evaluate how long it will take to finalize your tasks [2] It is something nobody wants to hear – they always know everything already and it starts from the top management [4] We have a lot of knowledge from the projects [4] Between the ears and not on paper and even so that others know that a certain person knows and will ask him [3] One person does the old project related task in 5 minutes and for someone it takes a week to find the necessary information [3] Every week I relay my tacit knowledge to design and it does not stick (tolerances, markings etc.) and repeat them over and over again but somehow always it is messed up and maybe taken from some old project [3] No need to use your head if you just pick up some old drawing and change the e.g. dimension [3] To what role does it belong e.g. to define surface treatment acceptance criteria or should it come from design and project management (customer) [3] Why do you always have to babysit grown people [3] Compare a white collar people to a lathe operator, how many times would you accept manufacturing error… once or twice [3] Professional pride has dropped a lot in time… people do not care enough [3] Can you always get away with just " whoops... it was an old base or I didn`t notice... or …whatever [3]	Gives tools for evaluating the big picture Nobody welcomes it We have a lot of it Helps day to day work People don`t care Whoops! To know who knows	Not really appreciated or utilized by the newcomers ⇨ What is impeding? ⇨ Professional pride
Meeting the customer: What tacit knowledge/weak signals you might have? Cultural differences experience [1] The only way to receive answers from the customers is to do the nasty job of asking over and over again [1] How to take the pressure from customer interface [1] Require from the customers immediate response that they have received the message and the next day what is their response [1] Quality: same bible different interpretations – this is how WE interpret it [1] Some of the things you have to comment out immediately in the project start because even some of the norms are counter effective (weight<>movement forces) [1] Some of the customer requirements hide a huge business risk if they realize [1] Certain customers always cash out on basis of the commitment which is made by us on basis of too little information [1] Different customers behave differently and you it impacts project management e.g. what they mean by their documentation needs etc. [2] I could give a lot of tacit knowledge face to face but collecting it somewhere may be challenging [3] You cannot give general instruction regarding cultural differences… to some people you can say "NO" directly and to some people you need to wrap it in cotton wool [3] We should be able to say no much more and keep that opinion than we do and you can do that if the facts are on your side [3]	Cultural knowledge Enduring pressure Ability to demand Same bible different interpretations Noticing business risks Decision making routines Reminding customers of our existence	Eye for the game comes with experience ⇨ Reports from meetings

With one guy we travelled a lot together in the beginning and gave opportunity for learning [3] Things to consider in export business, cartels, language ability, seniority, customs rules, finding out who decides [4] People who know about the technology do not make the decisions in Latino countries [4] You have to know how to wiggle yourself into the Latino organization – through the secretary you get a meeting with the big boss who will give you a name in middle management that he will instruct [4] Technical service is a very important business, people just don`t want to understand that [4] The customer forgets you unless you are in constant contact even if there is nothing to discuss – don`t take him for granted [4]		

Interview full table of notes, junior interviewees

Sentence used	Concept or key word	Policy
What`s wrong with this picture: Taking part in defining the product in the project [5] Putting the project in production together with production manager and quality [5] Measure of success in PM role is getting accurate and up to date information from your own organization to the customer and vice versa… if we could really know where the customer is in terms of his own schedule to understand our own position and relaying our own capacity information to the customers [5] Some people know more about some customers and others know about others… you have to ask to know [6] Different customers have different focus on things [6] Some project managers keeps design in cc and some don`t at all and there is no time to go and ask all the time where things stand [6] Design should have the possibility to comment on the quotes before they leave [6]…sales never asks how to quote some product [6]…it has improved but needs more communication [6] You take orders from everybody and not really from your formal supervisor, they don`t really know your workload [7] You hear a lot that "let`s end this meeting now so that we can get to the productive real job" [7] When everybody does their part and little more and we all row in the same direction, because everyone is in a hurry [7] I really like the way it is shared to everybody how the company is doing [7] It is really important to know where we are [7]	Teamwork Cooperation Joint effort Meeting practices Putting pressure on customer Cultural differences Way of working not standardized Experts should have their say More communication	Internal, external Work alone but bigger issues decided together Sharing knowledge Standardized work method More communication
How we work together: Knowing where allocated tasks are in our own organization regarding scheduling [5] Would hope that the seniors would verbally share their experiences when project challenges are in discussions [5] Agent or salesman is in key role to get accurate data, easier than for PM [5] At the moment I do not feel like I am doing sales [5] Designers don`t necessarily know about norm requirements because PM`s handle that [6] Regarding standards ecosystem you are just thrown into the deep… try to manage yourself the best you can. [5]… need a basic package to get started [5] Where there hasn`t been training (regarding a system) you can ask a colleague that really knows the system well [7] There is more peer support than actual orientation [7] ERP training for 6 days and no real training regarding the customers [7] Would have wanted some support myself back then (from designer to PM) and orientation in those days was not very sophisticated…don`t know if is now either [5] You`re left alone discovering the interpretation of a standard [5] It is frustrating when the customer PM is not capable of getting the required information… normally sales/weekly meeting/superior can help [5] I am really active in asking things when I don`t know [7] You want to be effective [7] You really need to work hard and be very precise [7] Every customer needs to feel they are the most important customer [7] There is no time to focus on customer service because you have to get the deliveries out of the door [7] You have to have a realistic view of the situation when you`re in between the optimists (sales )and pessimists (production) [7] Customers finally tell us why we are here and what we should do [7] One should be encouraging to newcomers [7] I`ve always received help or at least the knowledge who can help [7] Like the open office architecture when you can shout over the partition walls for help and walk into production [7] People have taken well the small improvements I have introduced from prior work relationships into this organization [7] I have had the experience that I can propose improvements [7] You lose the perfection attitude quickly because there is no time to dot the I`s [7]	Prioritization Roles Orientation Attitude Willingness to learn Courage Relentless, persistent Encouraging Work hard Lack of time compels to shortcuts Customer is king Mediating Open atmosphere	Process improvement in orientating new workers into and defining roles Orientation process improvement Role description Responsibility to get the job done Work ethics Personal characteristics, can they be learned or taught Attitude Organization treats newcomers well approving supportive company culture Nourish it

Documentation: Has everyone read all the documents and instructions that are in place already? [5] We have processes and instructions that are written how the customer wants to see them but we haven`t really described how we actually do decision making and progress in certain things [5] If I find out about a detail that is missing and important for everybody to know I add it to a template document that is accessible [5] I have considered could there be a project "REX" in parallel to the template documents… quite good is the review template checkpoint list when a pitfall is discovered [5] Would be willing to read "explicit" documents but finds it challenging to find the time [5] [6] [7] There has not been a person that leads design function and documentation is stored and described in a way that is not easy to understand… not necessarily the good practices are described… different people do in a different way [6] Trying to assemble a concise design manual [6]… might include a customer specific considerations part [6] Some of the old files cannot even be opened these days [6] SU-94001.doc defined as a virus by the anti-virus program [6] Some tests conducted documented but few people know where they can be found…try to collect them in one place [6] Need to have a datasheet type of approach on different products and solutions that we offer as standard…based on classification by norm requirement or target country or customer [6] I would not be able to create RAMS out of scratch… the old projects help… cannot imagine e.g. all the failure modes possible [6] REX is important e.g. the original designer could list improvement points and things he considered while designing… top 10 things to consider with a certain customer, some basic design practicalities like cable clamp types, why hit your head in the wall over and over again if a subject is really important to the customer [6] The little documents I have seen are relevant and to the point, not obsolete, by request people have made me new instructions [7]	Documentation Has anyone read all of them? Who can evaluate validity and value to others? Process description	Document responsible Everyone contributes to the base template document Everyone starts a new document from the base template document Design rules manual Check the documents and age the obsolete ones Collect the project specific type or validation tests to one place Lots of REX and tacit knowledge tied up in documents Does process description reflect the activities in real life, update
Sharing tacit knowledge: Project cost management and budgeting I had to totally find out about myself with no support [5] I like talking a lot but that does not reach everybody… so you should be able to read too…but that does not reach everybody either [7] No understanding on why we become selected as the supplier…I guess the sales knows [5] It seems that commercial offer binds us to what we eventually have to do [5] Excel checklist is good because it opens in all workstations [5] Skills matrix of what people know about [5] The system should be as simple as possible and not separate so it does not get forgotten [5] It cannot be more complicated than one link on the desktop where you type in the search word and see from the search result if this helps me [5] In terms of tools it should be part of the work process e.g. 5min per day or X min per end of the week… rush is a problem [6] per customer…per product [6] Tacit knowledge is valuable but has to be evaluated critically because there also might be wrong motivators… personally have tried to "mine the data" [6]	Talking about it Checklists for things to be taken into account Keep it simple In everyday use Everyone contributes Daily routine	Divide between oral and written full line survey about what people need information about most Identify what can be shared by peer support and can be lost in time and what needs to be preserved in writing
Beginner to expert: Watching and listening to older and wiser is where learning starts [5] When a projects presents a specification and other comments defines the actions… what solution is the right one fit for purpose… and identifying the pitfalls in the specification where the organization struggles [5] When the CbyC is done neglectfully the customer can force us into their will based on the comment [5] The best way to become an expert is to begin with project managers help in creating documentation [5] [6]… there you meet all of the product aspects… maybe shared responsibility then in a project… or responsibility in a smaller project and a more experienced member to support you in the difficult questions [5] Fits to mechanics as well as project management tasks… there is a big step from support role to management role… you might need additional internal training on project management aspect [5] You need to take time with that as well and talk about the critical things on business specific aspects [5]	Learning as you go Experience is valued highly among workers What are the barriers to peer support? Self-motivation to improve Working pairs Work in a project as a helper before you get one of your own	Introduce support person skills matrix to newcomers Evolve current skills matrix and make it available as a tool Documentation tasks to newcomers Support role before responsibility role, open the tasks to apprentice scrutiny and encourage Q&A Working pairs

Experience is more important than education for PM role [6] Education is important for detail design level tasks [6] Through collaboration... with a person you can work with… needs a person you can work with as apprentice [6] For PM role it was important to have been a part of other projects and meeting and seeing how it is done by more experienced [6] Expertise forms as you go along and do the things you need to do [7] It helps if you have done it before even if the system has been different [7] with formal training background [7] One is actively looking for an angle how to develop the work processes from a newcomer point of view [7]		
Learning: Taking part in project management course [5] Reading some books voluntarily [5] Some things learned at school [5] Some of the aspects caught along the way [5] It would require some training if I was to take care of more sales oriented tasks within the project [5] PM management course from work… school had a more extensive course on project management than the one organized through work [6] There is nothing that specific about our business in terms of process or practices… it`s more about the rail specific customer requirements [6] Outside designers blend in well…the problem is more in documentation like RAMS etc. [6] Orientation yes… supervisor discussions, performance review, weekly meetings are good, specific meeting are good because there are the people it belongs to [7]	Learning by traditional ways Challenges with industry specific issues Role orientation	General training to newcomers about industry specific disciplines like RAMS. LCC, Norms Create introduction documents, keep it simple and require Q&A Keep up the weekly meetings and encourage asking questions KPI of a role?
Product development: Once a year we should have a discussion between commodity/sales/design to foresee what should be developed [6] Organization of product development is weak and all PD is done for projects alone in mechanics [5] [6] Mechanical space allocation and standards that become more stringent drives innovation [5] Demand comes from sales in project phase with awarded contracts [5] [6] … and the un-mature design is already being copied to other projects [6] There is no long term planning that is based on reviewing the standards terms [5] Theme day on a subject [6] Brain storming around an existing product [6] … where do you find the time [6] Some topics keep popping up but the new guys don`t know it [6] We could have avoided some mistakes by doing more calculation before making and testing prototypes [6] Sales is selling things we do not have [6] We should continually advance in the product development field… when you test on the field it costs: drawing board 1X, protos 10X, field 100X, after sales 1000X [6]	Foresight wanted Long term planning wanted What has already been tried Sales driver REX-framework Simulation before proto	Formalize innovation management and product portfolio thinking Innovation management plan Product portfolio with life cycle plan Every designer should visit a least some trade show Keep up the discussion between sales and product development Report on what customers are asking for Theme day in conjunction with a new development program (even if it comes from a project need) Try it once and see if it works
Tacit knowledge is: Knowledge that is difficult to make explicit or to relay to others… e.g. constructional solutions that are aimed at solving a problem…when that leads to even a bigger problem so you don`t offer that to this customer… or how a specific customer behaves [5] Inside the head, experience based knowledge on what works and what doesn`t and what should be developed further and what has already been tried many times… helps you navigate and avoid bad choices and narrow the field of choices… you have to go and ask yourself [6]	Tacit knowledge as a concept Inside the head Important	Make people more aware of what tacit knowledge they might have compared to the rest of the organization visit report form keep up oral reporting in weekly

Important to record tacit knowledge if you want to keep the knowledge in-house and have, better, more efficient workers [7]		meetings
Meeting the customer: What tacit knowledge/weak signals you might have? Consequences of selecting certain technical solution with a certain customer [5] Making project management choices that have led to unexpected reactions [5] Sometimes you have to be really careful on how deep you go into a technical discussion without official commitment because some customers tend to refer to your words later on "you said that"… sometimes you may expose something of your own organizations characteristics that you wish you had not said out loud [5] Could share knowledge in e.g. Customer X and fire door issues [6] Tried to ask project people in different occasions what problems we or other suppliers products might have [6] If there is something wrong with the customer I will relay it to the project manager [7] Many customers might know that you are a temporary worker and it effects the communication [7] Some customers never contact me directly even though I always answer him/her and he knows that the person he is writing to is not in for a longer period [7]	Behavioral Cultural pressure points Tolerance for unambiguity Technical Seniority requirement Escalation	Make people more aware of what tacit knowledge they might have compared to the rest of the organization Training for customer encounters with different cultures Lessons learned from incremental product development projects, keep it simple
Pressure from customers and suppliers: Different customers have different demand level… you can resist their demands differently…PM/sales decides on when to give in and when to keep our head, designers "just do it"… end customer matters more than who is PM`ing the project [6] Fearing the big customers… failure to serve impacts big volumes [6] You prioritize based on who complains the most, partially by the meetings and finally by asking from the supervisors supervisor [7] When you are placing yourself too deep into customers shoes it might cost the organization a lot in the product and meet internally organizational resistance [5] Seen also solutions that we have proposed that customer rejected from us but allowed for another supplier… we have to keep our head in the things we feel are important [6] Why do we give up on important features in our product in fear of facing the customer confrontation [6]	Customer applies pressure on us Defending our product features Feeling unsure Mediator	Escalation pattern Prioritization authority Role authority for decisions Boss must back up