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Knowledge Sharing and Reuse Challenges in Information Systems

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Insinöörityön tarkoituksena oli kartoittaa ABB Drives Oyn tiedonjaon keskeisimmät ongelmat ja miksi tiedonuudelleenkäyttö ei ole halutulla tasolla. Yrityksellä on ollut haasteita tiedonjakamisessa organisaation sisällä.

Näiden asioiden selvittämiseen käytettiin ABB:een työntekijöiden kanssa pidettyjä haastatteluja sekä globaalia kyselyä antamaan ymmärryksen nykytilanteesta.

Lopputuloksena syntyi ymmärrys missä suurimmat ongelmat ovat ja mihin organisaation tulee keskittyä. Luotiin ehdotus mitkä voisivat olla seuraavat ”ToDo” joilla tätä asiaa viedään kohti haluttua lopputulosta.

Ymmärrys nykytilanteesta antoi tiedon mihin organisaation tulee keskittyä, jotta pystytään parantamaan aika- ja raha tehokkuutta.

Avainsanat	Knowledge creation process, SECI, IMS, CoP

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The objective of this Bachelor´s thesis was to discover the core problems when sharing and reusing knowledge inside ABB Drives Oy. The aim was also to research why the sharing and reuse of knowledge is not on the level where it should be. The case company has experienced problems due to slow knowledge flow so this was a significant topic to examine.

To point out these problems, employees of the company were interviewed and a global survey was used to analyze and clarify the current status.

Understanding of the current status of the organization produced also concrete data on how the organization can improve its time and cost-efficiency.

As a result of the study, a clear understanding of the current status was obtained. Based on the survey and the interviews, improvement suggestions for the future were created. Also future solutions how to proceed with the next steps are suggested.

Keywords	Knowledge creation process, SECI, CoP, IMS

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Abbreviations

ABB	Asea Brown Boveri
IMS	Integrated Management System
R&D	Research and development
SECI	Socialisation, Externalisation, Combination, Internalisation process for knowledge creation
Herbert Simon	American scientist awarded with a Nobel Prize whose major interest was in the decision making inside organizations
CoP	Community of Practices, group of people who share best methods and practices

1 Introduction

The thesis focuses on researching what the pain points are in knowledge sharing and the difficulties of knowledge reuse in the case company. Information systems are in everyday use and play a big role in everyday work environment.

The author will focus on researching the problems that the case company faces in knowledge sharing and why the reutilization of the knowledge is not on a desired level. In addition, the objective was to analyse the current status and to point out the key pain points in knowledge sharing.

The pre study before the start of the research showed that the usage of information system for knowledge sharing is not on the level where it was supposed to be. Sharing of the knowledge takes place in most of the cases face-to-face and through networking, so it is important to raise the level of information systems.

The case company started using a new IMS system in the fall of 2017. This triggered the need to know what is the current status of sharing and reusing knowledge and if it is on a level where it should be.

The thesis contains six different topics. The first topic introduces the research study. The second is a literature study, with the proven best knowledge sharing and reuse practices. The third topic contains an introduction of the case company. The fourth topic examines the current status and the main pain points in the case company. The fifth topic suggests solutions for the next steps for future.Finally, a summary of the thesis is included.

1.1 Business challenge

In a global company, new systems are taken into production rapidly and new software is being implemented and tested constantly. Without standardized knowledge sharing methods, the results e.g. project documentation and project quality differ from one another.

The need is to raise the awareness of the new systems in use for knowledge sharing. In a global company, the knowledge sharing methods differ when looking at the geographical locations. In this thesis the main geographical focus will be in Finland and in the R&D operations.

Currently the knowledge sharing is carried out mostly face-to-face or inside organization networks, and the knowledge is employee dependent in most of the cases. If we think about how much different knowledge there exists in a large global company, and all of it should be easily shared and accessible, which is almost impossible, but if we can raise the awareness of the systems in use even with a minor fraction, it will have a huge improvement impact on knowledge sharing and reutilization.

The owners of a specific knowledge area have to share the knowledge many times, which is an extra cost for the company. The time used to search for the specific knowledge increases and causes waste time in everyday work.

1.2 Objective and outcome

The objective of this thesis is to research what the pain points are in knowledge sharing inside the case company and how to improve reutilization of the existing knowledge. This thesis discusses also how to and, in addition, to give a financial aspect how much the company is wasting money on work caused by the non-fluent knowledge share and reuse.

In the literature chapter, the author will describe the basics of what different type of knowledge there is and how the proposed knowledge creation process should take place in an organization. To gain a better understanding of the business problems, a comprehensive knowledge survey will be used as a knowledge gathering material to point out the major pain points. The survey will gain knowledge how much waste time is being used and to suggest solutions how we can improve the everyday work inside the case company and the co-operation of divisions globally. With the survey data, a cost-benefit analysis will be made to give a financial perspective. To validate the survey results, coffee break interviews will be used as a validation tool to point out the major pain points and focus on the similarities that are found in the survey and interviews.

The outcome of the thesis is to suggest a proposal how to improve the knowledge sharing and reutilization of the knowledge in the case company's operations. In addition, the aim is to give answers to the question what are the main pain points in knowledge sharing and how we can reduce the waste time being used into non relevant things when sharing and reusing knowledge.

1.3 The scope

The scope of this thesis is to consider common knowledge theories, company interviews and surveys to show how those can be revealed in areas where the company should focus on handling challenges in knowledge sharing and reuse. Interviews and the survey are analysed mainly from a platform point of view. The focus will be on analysing the globally distributed knowledge survey and validating the gathered survey results with employee interviews.

This study does not present multiple various information systems, as it only focuses on the difficulties of the actual knowledge sharing and its reutilization.

1.4 Research methods

The methods used are interviewing the employees and drafting a survey that will be distributed throughout the organization. Employee interviews will act as a validation tool to validate the gathered results from the survey.

The data analysis for the theory part is based on the knowledge survey, today's literature and internet researches.

1.4.1 Research approach

Action research has been chosen for the approach because the need is to identify pain points in knowledge sharing and the lack of reuse. The first action to take place is gather

x number of people into a “coffee” discussions. The discussions will provide a better understanding about the current paint points that the employees are facing in their everyday work.

Research design for this thesis is based on the methods of action research. In the action research model, the main pain points have been identified.

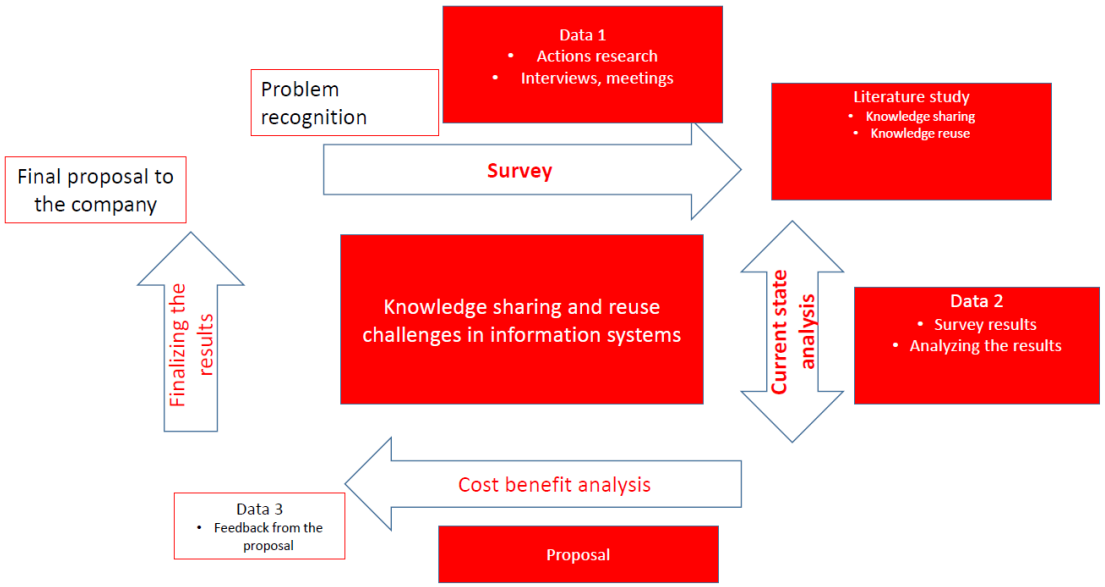

Figure 1. Research design

2 Knowledge creation

In this chapter the author will explain knowledge in a practical aspect how they can be implemented into everyday working environment when sharing and reusing knowledge. The theory part focuses on explaining the basics of information systems, knowledge management, knowledge creation in practice and the aspects why knowledge sharing and reutilization plays a big role in modern days´ working life.

We are now living in a knowledge-based society, where knowledge is the source of the highest quality power.

– Alvin Toffer

2.1 What is knowledge

What is knowledge? Knowledge can be awareness of understanding something like facts, information, skills and they are gained through experience self-learning, education or learning. Regularly knowledge is predictable so you can understand the needed patterns and it can refer to understanding of a theoretical or practical topic. The clever manager recognises the importance of the "€" in the company's yearly revenue statement. This gives readiness to the manager to carry out the needed actions. Knowledge guides our actions as information and data can inform or confuse. (Groff, Jones 2003, 3.)

2.2 Information system

An information system can be divided into three components: hardware, software and data.

Hardware is something you can physically touch. They are the actual components you can see with your own eyes, for example hard-drives, keyboards, tablets, and laptops (Dave Bourgeois and David T. Bourgeois, 2012).

Software developers write commands to a hard drive to do the wanted things. Software can be divided into two main categories, operating system software and application software. Operating system software tells the hardware to do as commanded, to make something physical usable. Application software that makes something useful to the user, but you cannot touch it physically, for example Microsoft Excel. (Dave Bourgeois and David T. Bourgeois, 2012)

Data is a collection of written facts. With data you can define e.g. personal information (city, address, and phone number). As a standalone, the pieces of data are not useful. When the data is organized, indexed and gathered into a database, it can be a useful tool in the business world. As presented, hardware and software both contain data. Organizations collect all kind of data to help them to make decisions and improve their way of working. (Dave Bourgeois and David T. Bourgeois, 2012).

To sum up, an information system is a combined set of components that help you to collect, store and process data to provide / distribute information, knowledge and physical products. (Dave Bourgeois and David T. Bourgeois, 2012)

Figure 2. Venn diagram shows the relationship between information and knowledge

In the knowledge creation process, normally individuals blindly embrace the classical meaning of knowledge as a justified belief. In classic Western thinking about theoretical knowledge, the truthfulness is a necessary attribute of knowledge. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 3)

2.3 Strategic information

There are three major areas where strategic information plays a big role.

The first area is where organizations use the information to make sense of the changes inside the environment. Companies thrive in an environment that is constantly and dynamically changing. There are certain things that need to be secured in order to make the organization to function properly. The secured things are the following: supply of materials, resources and energy. An important note to the management is to discern the most important changes and to analyze what the changes mean. After the analyzing has been completed, the management need to make changes according to the results. In a brief period of time the goal for sense making is to create a common understanding for the organization to function in a needed way. In the longer run, it is important to keep the organization thriving in a rapidly changing environment (Chun Wei Choo, 2006 The knowing organization
, 2).

The second area in strategic information is where organizations create the knowledge. Knowledge will be shared in different forms and individuals will create the knowledge based on the learned practices and experience. This type of knowledge is persons´ own and in hiding in individuals´ minds. To organizations this type of knowledge is the most interesting one. Mostly it is the source of creativity and innovations, and without it organizations cannot create knowledge. It is good to note that organizational knowledge is not the same as the compilation of several individuals' knowledge. The knowledge is embedded into the person's mind. A knowing organization is alive because of the ability to channel and integrate knowledge into important activities and values (Chun Wei Choo, 2006 The knowing organization, 2).

The third area in strategic information is searching for the knowledge and evaluating it to make the required decisions. The best theoretical approach to this is to rationalize the existing knowledge. The rationalized knowledge is based on the organization´s goals, executable alternatives, and likely outcomes for the organization. Decision making is mixed with the impact of the different opinions among the stakeholders. All the complications e.g. information being hard to find, features of the individual decision makers and the shortage of time and resources. Decisions are the most important things, all the decisions are part of the way where the organization is going towards, decisions initiate actions and actions are the commitments of the decisions. Organizational behavior can be analyzed based on the actions of the decision making. Herbert Simon states that management is decision making. The way to analyze the organizational behavior is to analyze the decision making process. (Chun Wei Choo, 2006 The knowing organization, 2).

In the strategic information it is important to be aware of the key goal where you are aiming at. Note that all people are different learners and you cannot fit all into the same type of category. Know your employees, and what kind of learners they are.

2.4 Tacit, explicit and cultural knowledge

Tacit knowledge refers to personal knowledge and it is embedded to individuals´ experience involving abstract factors e.g. personal belief, routines, ideas and values. Difficulty of tacit knowledge is transferring the knowledge to others. The reason for difficult knowledge transfer is because tacit knowledge is an analogue process. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 3), (Groff, Jones 2003, 3.).

Tacit knowledge is something that the person has experienced. Tacit can be translated and it means *hidden*. The knowledge can be hidden even from the knower and the knowledge comes spontaneously from sub consciousness. For example, if you think about whistling, you can do it easily by yourself but teaching it to others might be difficult.

Explicit knowledge has been documented somehow. It is in a form of data, known language, scientific formula, manuals etc. The knowledge can be easily transferred to others. (Groff, Jones 2003, 3.) The question is, how to make tacit knowledge explicit? One relevant difference between tacit and explicit knowledge is the transferability of the acquired knowledge and the mechanism that affects the transferability. If the tacit knowledge cannot be formed into explicit, it is then costly, slow and not 100 % accurate. (Kogut and Zander 1992). For the organization, explicit knowledge acts as a source for multiple purposes. With explicit knowledge, the historical learnings are easily accessible. Good practices have been transformed into explicit knowledge and this has an effect on avoiding double work.

Cultural knowledge is not so often mentioned in the category of different knowledge types due to the fact that knowledge is often presented as a justified belief. Inside an organization, the cultural knowledge is a combination of beliefs and holdings of justified knowledge that are derived from persons´ own experiences, scanning the things happening around you. Most of the times cultural knowledge can reflect relevant questions that are persons´ own opinions, shared subjects inside the organization etc. (Chun Wei Choo, 2006 The knowing organization, 143-145).

Normally knowledge has been viewed as explicit. You need to understand that both tacit and explicit knowledges are complex and these two types are needed for a knowledge creation process, without forgetting the cultural aspect. These two types of knowledge interact with one another.

Tacit knowledge	Explicit Knowledge	Cultural knowledge
Knowledge of experience	Knowledge of rationality (mind)	Consists of belief that e.g. organization holds true and justfiably
Informal and uncodified	Formal and codified	Experimental, understanding of cultural traits and patterns
Values, perspectives & culture	Documents: manuals, standard processes	Words, customs traditions, assumptions
Hand-on skills, special know-how, personal experiences	Books, journals, magazines	Factual information obtained through communication, research

Figure 3. Three types of knowledge

2.5 Knowledge management

Nowadays working life is hectic and constantly new tools come to market. People need to adapt to the rapidly changing working environment. If you do not know, how to manage your knowledge, you are in a trouble.

Knowledge management is a summary of different tools, techniques and strategies to retain, analyse, organize, improve and share business expertise. Business aims to make sure that the success factors are based on mainly managing of the physical resources.

Nowadays information economic companies try to develop and retain their “infinite asset”, the knowledge of the employees. Contrary to other assets, knowledge is not depleted after it has been shared. Knowledge invariably is a result of increased knowledge for both parties (Groff, Jones 2003, 2.)

Knowledge management targets on exploiting the new approaches to filter the raw data into useful knowledge.

2.5.1 Knowledge management pitfalls

If you want knowledge management to work, you need to take into consideration the most important foundations, and they are: people, process, culture, technology and structure. (Kahane, Avoiding KM pitfalls 2017)

The people inside the organization are called upon to draw from the system and they are encouraged to contribute to the system. The work they do is dependent on how the system is presented and promoted. (Kahane, Avoiding KM pitfalls 2017)

The process will determine the easiness so that the people can take and insert information into the systems. You need to have the process integrated into the workflow. (Kahane, Avoiding KM pitfalls 2017)

The culture is reflected in how people look at the information and also how they extract the chosen data to other employees. It is essential to encourage people to use the information effectively and give rewards, if the information is easily accessible, since it will result in effective sharing of knowledge with enthusiasm. (Kahane, Avoiding KM pitfalls 2017)

With good nowadays technology makes the people to engage the existing process and have a good effect to the working environment. With the technology you employ it will have a direct effect in your knowledge management success rate. It is still important to keep in mind that if the technology is not supported with the context culture, with motivated people the rate to failure will increase. (Kahane, Avoiding KM pitfalls 2017)

When structuring your knowledge management it is important to keep tabs of the workflow process. Keep in mind the working languages and listen to the users who will use it. (Kahane, Avoiding KM pitfalls 2017)

2.6 Knowledge creation process

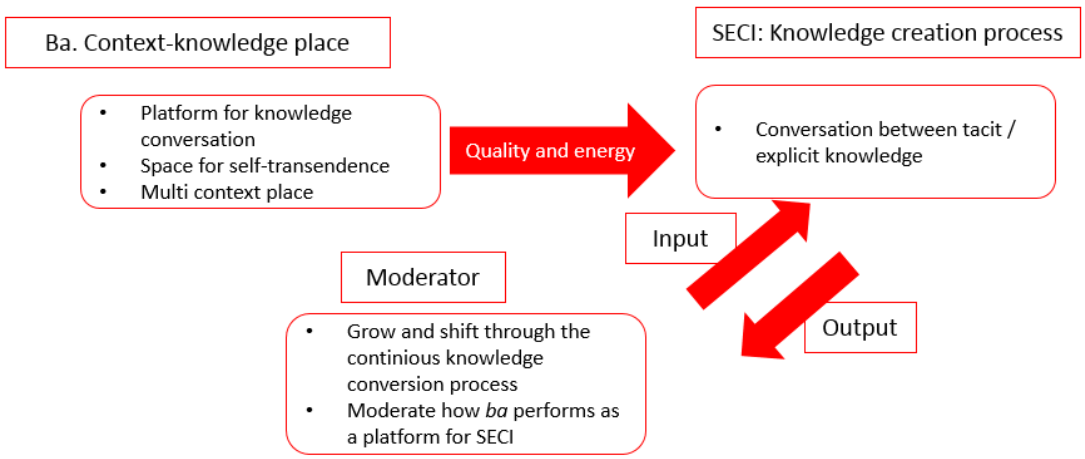

Figure 4. Elements of knowledge creation process

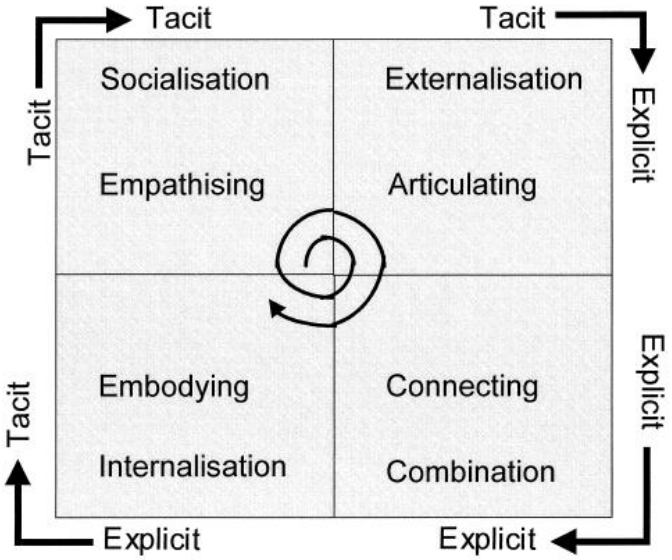

Figure 5. The SECI process

To understand the knowledge creation process, first you need to understand how to do it dynamically.

The first one is a SECI process. This is a process for creating knowledge in conversion of tacit and explicit knowledge. SECI is shortened from words socialisation, externalisation, combination and internalisation. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 5).

In socialisation, the process idea is to convert the new tacit knowledge over to shared experiences. Socialisation takes place in a situation where the students learn the needed skills through hands-on exercise, instead of writing manuals and textbooks. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 5).

The second subject is externalization. In this subject, tacit knowledge is indicated and formed to explicit knowledge. As the tacit knowledge is formed into explicit, the existing knowledge is clear and it can be distributed to people as a knowledge base. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 5).

The third subject is a combination. In this subject, the knowledge transforms to explicit and into a systematic knowledge. The knowledge is created from outside sources, not inside of the organization. After that it is connected, analyzed and put into process to create new knowledge. This is a creative way to be used in computerized communication network, gathering data inside the company to make a report from an example revenue statement. The new report is a combination of different data from different sources. This can be used to break down the concepts from corporate vision to clear the operational business. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 5).

The last part of the SECI process is internalization. In internalization, the individuals transform explicit knowledge to tacit. Knowledge is shared inside the company and converted by employees. Internalization is a practical way to learn by executing it. Explicit knowledge needs to be, for example a product concept or a manufacturing process, and they need to be executed through actions and practices. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 6).

Training programs are made to help the trainees to gain the big picture about the company. By going through the documents and manuals about the job that has been done by the individuals, the trainees can adapt this explicit knowledge to enrich their tacit knowledge. As the knowledge becomes internalized, it can be a part of the trainee's tacit knowledge base and for a solid base and form a model and know-how. This is a valuable asset to the company to gain a more enriched tacit knowledge base. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 6).

Figure six shows how the knowledge movement happens in the SECI process. As shown in the figure five, the movement takes place through the four named spaces in the knowledge spiral. The spiral has actions from both tacit and explicit knowledge and they

are strengthened in the four spaces. Knowledge that has been created with a SECI process can make new spirals and it can be expanded through the organization and in important things in the knowledge creation process. SECI is a dynamic process, which starts at a personal level and expands when the process goes through the community of interaction. Then it overruns all of the organization limits. The creation of knowledge is happening all the time and the process can never be stopped. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 6).

Ba knowledge context place

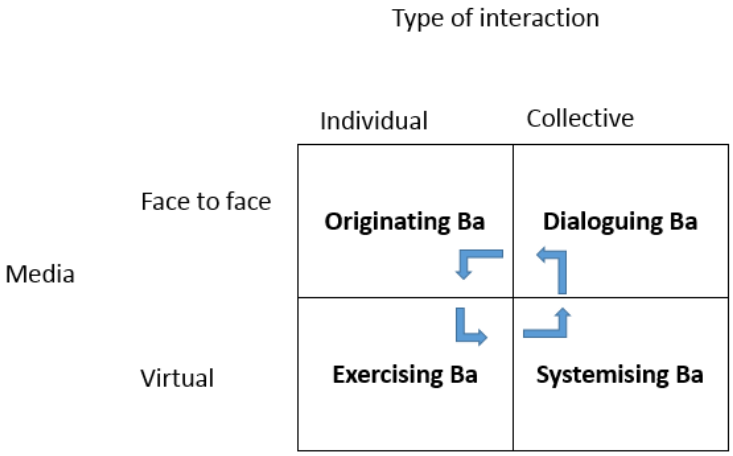

Figure 6. The four types of Ba

Knowledge needs a context when it is created. Cartassian has another perspective on the matter (knowledge to Cartassian means knowing of something beyond not merely all reasonable, but all possible, including doubt). The knowledge creation process is context specific. Knowledge requires an actual context created, and without an actual place there is no knowledge creation.

Ba comes from Japan and means a place, originated from the Japanese philosopher Kitaro Nishida. Ba is a context where knowledge creation happens and the knowledge has been shared and used. In the creation process, Ba plays an important part. Ba's

energy, quality and the place offer the conversion and allows the movement of the spiral. The key to understand ba is interaction. The research of knowledge creation is focused into individuals. Based on the presumption that, when creating knowledge it has been done by individuals. Ba is a place where information becomes knowledge

Word Ba does not literally mean *place*. It comes from a Japanese word and more specifically, it means *space* and *time*. Martin Heidegger (German philosopher) expressed the word Ba as a locationality. According to Martin Heidegger´s concept, the unified physical space can be, for example an office, virtual space (e.g. emails) and the inner space with different ideas.

Understanding Ba goes through “interaction”. The creation process focuses on the presumption that all the people involved are drivers for the knowledge creation and all the knowledge creation happens in the individual´s own head. An individual’s activity is the creation process and the main role is to adapt the already known knowledge. This point of view to knowledge is that humans are being static and inhuman. The knowledge creation process is a dynamic process driven by humans. Knowledge creation happens in interactions with individuals not by individuals creating the knowledge alone. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 11).

Ba as a context can be shared with individuals interacting with each other and with self-transcendence to make knowledge. Participants need to be motivated and committed to the creation process. Knowledge is intangible and not bounded, and because of its dynamic feature, it cannot be stocked also. Ba is a fundamentality for the knowledge creation process. It is fundamental by gaining all the know knowledge from the selected area in specific time and space by integrating it. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 11).

Ba has common features as “community of practices” (CoP). Cop differs in a way that the members of the community learn the knowledge by attending to the community. The difference between Ba and CoP is the place of the actual CoP members where they learn the knowledge that is existing inside the community, and in Ba the actual knowledge will be created. In CoP things happen on a minor level before the members will become full members. There is four different Bas. The four types are origination Ba, Systemising Ba, and excersing Ba with two interactions. The interaction happens on an individual

level or it can be collected. Media can be the interaction if the situation is a live person-to-person situation or digital media, e.g. e-mails. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 12).

Originating Ba

By originating Ba in this context refers to individuals and their person-to-person action. It is a place where they share the acquired knowledge, human feelings and physical models. Physical person-to-person interactions are the only way to gather human emotions, feelings and live responses. This is a key element when tacit knowledge is being shared. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 12).

Dialoguing Ba

By dialoguing specific and collective face-to-face interactions, individuals share their own mental models and the learned skills. During the sharing process, the experiences are converted into terms and concepts. Constructing is formed in a conscious way, much different than the originating ba. In dialoguing the individuals have been selected with the right type of knowledge and capabilities. They are the key elements in knowledge creation in the dialoguing part. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 13).

Systemising Ba

This subject is about collective and virtually produced interactions. Systemising provides a model of already gained explicit knowledge. Due to the easiness of explicit knowledge transfer, it offers an environment that can function virtually to create systemising Ba, for example handling of mass user rights. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 13).

Exercising Ba

This subject deals with personal and digital human interactions. The purpose of exercising is to offer a context to internalisation. In this type, the individuals gain explicit knowledge to what has been gathered through virtual media. For example, a shop floor employee with tacit knowledge gains more experience with face-to-face interactions with the customers, and with this wide knowledge the employee can just see what the customer needs without interacting with them. The Japanese seven-eleven concept has a requirement for all of its workers that they need to work for two years on the shop floor to get acquainted with the customers´ behaviour. (Nonaka, Toyama, Konno, 2000 a unified model of dynamic knowledge creation, 13).

3 Case company

3.1 Introduction

ABB (ASEA Brown Boveri) is a global corporation, which manufactures various type of products, mainly related to power and automation. ABB's headquarter is located in Zurich, Switzerland and the company has operations in 100 different countries. In 2016, ABB employed approximately 132,000 people and the revenue in 2016 was 33 billion US$. (ABB.com, 2018)

The main geographical focus of this thesis is on ABB Finland's operations, with approximately 5500 people working in different locations. The factories are located in Helsinki, Vaasa and Porvoo. Drives Finland's operations manufacture low voltage frequency con-

verters. Drives is responsible for the global sales, marketing, and research and development of the converters in ABB. The project was commissioned by ABB Oy Drives Helsinki. (ABB.com, 2018)

The Helsinki factory has been located in Pitäjänmäki for over a hundred years, and was originally known as Oy Strömberg AB. The factory was established in 1889 in Pitäjänmäki where the original manufacturing of electrical motors and generators took place. Nowadays products manufactured in the Pitäjänmäki factory include e.g. frequency converters and electrical motors. ABB´s continuous product development makes ABB one of the leading manufacturers in the specified market. The Helsinki unit also has product maintenance, and it provides repair services and initialization of products around the world. (ABB.com, 2018)

3.2 ABB Oy Drives

ABB Oy Drives is a sub company under ABB Oy. If you look at ABB Drives as a whole, ABB Drives Oy is under the global drives organization. ABB Drives Oy is divided into three different organizations. Two of the organizations have the responsibility for the manufacturing operations of ABB Oy Drives. Drives service is responsible for the after sales globally and locally, and is also responsible for the spare part sales of ABB Drives. Service also assists on the maintenance of the distributed products worldwide. All of the operations are located in the Helsinki factory. (ABB.com, 2018)

4 Current state analysis

This chapter examines the current status of the case company's current challenges with the knowledge sharing and reutilization. The aim was also to justify the belief that a fluent knowledge sharing and waste time reduction will result in an improved level of quality and documentation.

4.1 Background

Inside the organization of ABB Drives, there are several places where to store and search for data. Employees are confused with the following issues: where to find the specific data and where to store it.

With a large global company, the change management is a long process. Platforms where the data is stored are, e.g. SAP, SharePoint, local drives, Wiki-system and the new IMS system. Time to adjust and accept the new way of working takes time. When changing one revision control system to another, not only the change management is the problem, but also the massive amount of data causes challenges.

The current state analysis was carried out on the basis of coffee break interviews and the knowledge survey. With the survey and coffee break interviews, the big picture of the problems was clarified. When interviewing the employees similar problems emerged. With all of the platforms and their massive quantity of data can be seen as a major challenge for the employees. Employees do not know how to share and acquire the needed knowledge.

4.2 Coffee break interviews

Coffee break interviews are normally short conversations in a neutral environment where the interviewee feels relaxed and the interview structure is not strict. A questionnaire with top level questions was used, see figure 7. This type of iterative action research was a good way to validate the results that were collected from the knowledge survey. Please note that all the answers are the employees´ own and have not been modified in any way.

Coffee break interviews

1. Describe your personal opinion about the knowledge sharing and reutilization in ABB Drives?

2. What are the major pain points when sharing knowledge in ABB Drives Oy?
   a. Why?
   b. Currently doing the wanted improvements, can they be done?

3. Where do you see the most important place for improvement in knowledge sharing?
   a. Why?
   b. Currently doing the wanted improvements, can they be done?

4. Existing Good things when sharing knowledge

5. How do you reuse knowledge in your everyday work?

6. What should be the level of knowledge share and reuse?

7. Free comments and discussion about ABB's status of knowledge sharing and reutilization

Figure 7. Interview template

To understand more specifically what the current challenges and pain points are, 15-60min coffee break interviews were held as a basis to understand the core challenges in knowledge sharing and reuse inside the organization. The people interviewed have years of experience or they have freshly started working inside the company, new employees, executives in management positions and trainees. With the interviews, the challenges became clearer and more visible. The knowledge and the coffee break interviews acted as a basis for the knowledge gathering material to point out the current status of the company with the knowledge organization survey. The following interview planning was held according to appendix 1.

4.2.1 Personal opinion about the knowledge sharing and reutilization

- Organization contains lot of tacit knowledge
- Networking plays a big role inside the organization
- Organization culture is based on tacit knowledge
- Not a lot of motivating factors that motivate to search for knowledge
- Originally there were no platform where everyone could share their knowledge, now the thinking has changed and such platforms are in use
- Receiving new way of working faceses a lot resistance. Change management in a big role
- Internal network of experts in a big role
- Even inside the internal network community there is no looking into the future, only looking at the present status
- Lot of platforms when sharing the knowledge, confusion which of the platforms to store what data
- No unified project documentation defined specifically enough
- Too much sub task sided with main tasks
- People do do and do before they do the research if the thing they are about to already exists
- Loads of unofficial forums where employees discuss with various different topics
- Problem with knowing who know's the needed information, then the reutilization suffers
- Knowledge sharing between global business units is not active
- The knowledge of who is the expert who knows is not out there, that what the knowledge sharing organization is trying to tackle
- Need for metrics to measure the usage of the platforms is needed
- Knowledge sharing and reutilization has not landed into the organizations working culture in a wanted way
- Need to search information outside the company. Not enough actively benchmarking results outside the company → due to that some of the knowledge and area of expertise is not in a level where it should be

Figure 8. Personal opinion from the employees about the status of knowledge sharing and reutilization

To summarize figure 8, tacit knowledge is in a big role. Users are also struggling with finding the needed information easily. It is important to know the right person to contact with, since information systems do not provide the information in most of the cases.

4.2.2 Major pain points when sharing knowledge inside the organization

- Too many tasks, prioritization of the main tasks
- No communication models exist
- SharePoint and other platforms do not reach the required audience
- People get too comfortable on the stuff that they already know, no interest to explore new ways
- Most of the platforms do not reach their full potential
- Limited access inside the platforms → transparency
- People pawn the info, trying to make themselves indispensable
- Knowledge culture, there is no open knowledge sharing culture
- Only small piece of the working day can be used to knowledge reusing
- Spending one hour to share knowledge does not bring enough additional value to the user
- Lack of time to learn something new
- Scared to share the knowledge in the fear that it might be wrong and own knowledge is incorrect
- Busy people don't see the value for their time to share the knowledge
- Too much going back and forth, improved decision making
- Too much new tools and softwares being implemented constantly → creates confusion
- As soon as you see that the information is not up to date, user looses interest towards the subject
- Searching for knowledge is hard → no structured way to search for knowledge
- Change management towards SharePoint
- Working in small groups → causes double work → no transparency of the ongoing things in cross BU's or even teams
- Travel restrictions limit the knowledge sharing
- Requires a lot of interest, people need to see the clear value that they are getting from that info
- Between projects the knowledge is not shared enough
- Networking between functions is poor
- Too much double work. Already existing things are done again
- Need to raise the awareness of the product architecture
- Bring management closer to

Figure 9. Major pain points in knowledge sharing

Employees do not know well enough the purpose of each platform, which creates confusion about what to store and where.

4.2.3 Most important place for improvement

- User friendly platforms
- Bring the open knowledge sharing more into everyday working environment → knowledge transparency
- Define the right amount of various platforms, enough is enough
- Information sharing software's require better guidelines and help instructions for the users
- Need to be critical what kind of content will be in which platform
- Project framework should be raised higher in the priority list
- Too much manual copying → waste time increases
- RnD manager to raise the awareness of the importance of knowledge sharing
- Need to connect reusing and knowledge sharing together
- Improve the current open knowledge sharing platforms
- People who pawn the information → make it available → increases individuals status and knowledge as expert of the area
- Too much going back and forth, improved decision making
- Avoid sites named "work in progress" visible to users
- Make knowledge more transparent
- Bring platforms under users radar → no need to grant access to all, but the awareness that what is out there
- One entry point, list of all the platforms that are in use → raise the awareness
- Search engines not in a level where they should be → require improvement
- Knowledge is shared inside the interest groups → more active sharing inside the organization
- Get rid of the need of a single person → train others
- Too much knowledge inside inviduals head → need for documentation into the platforms
- Avoid redoing the current know good processes only based on "feeling"

Figure 10. The most need for improvement

The needed knowledge is not transparent enough. Need to bring the knowledge easily available for the end user, and have platforms that support ease of use.

4.2.4 Existing good things when sharing knowledge

- Lot of good platforms that send the msg to user to create content
- Platforms where all of the employees can go can create content
- Continuous improvement with the search engines inside different platforms
- Continuous agile development happening
- Webinars
- Knowledge owners
- Knowledge sharing sites
- Local workshops
- Wiki success stories
- Practical success stories in successful knowledge sharing
- Knowledge flows fluently inside small group
- Many time “cryptic” data has been processed before distributing it
- Saving of time when reusing the knowledge e.g existing project data
- Lot of good data ends up into the systems
- Local networking is working
- List of knowledge sharing organization to help the employees to track down the one’s who know and what.

Figure 11. Existing good things

Organization has loads of good things happening and continuous improvement is being done all the time. Improvement is being done constantly but is the focus in a right direction?

4.2.5 How do you reuse knowledge in your everyday work?

- Project documentation
- Reusage of templates, checklists
- Use of tools
- Lean six sigma projects
- Communication through community of practices to share the best learnings
- Benchmarking the existing knowledge
- Gathering knowledge outside the company → benchmarking

Figure 12. Reuse in everyday work

4.2.6 What should the level of knowledge share and reuse be inside the organization

-Global knowledge sharing with own competence area
- Global networking, now the knowledge is buried deeply in to single individuals, need to get it to a level where everyone can access it
- Easily to identify people in your own competence area
- Form communication plans to local and global communication
- Bring the right information in the right time to the customer →add more value
- Easily to transform the learned know how from local site to globally accessible
- Ready made products should be easy transferable from local life cycle aspect to global, easily
- Culture should be that we search for knowledge outside the company, more interest towards what others are doing better than we are
- Aspect that the knowledge exist elsewhere that inside the company, need to get rid of that
- Networking models where knowledge sharing and reutilization are normal standards
- Platforms need to serve information in a way that the user does not need to search for a actual person to provide the information
- Architecture should guide technology to reutilization. When new knowledge is created it should be actively shared

Figure 13. The wanted knowledge share and reuse level

4.2.7 Free comments

Free comments

- Knowledge needs to be understood before it can be found in the system
- Need for active networking outside the organization, partners, conferences and also competitors
- Best knowledge is not necessarily inside the organization
- Good platform is not enough for effective knowledge sharing. Also the support from the management is needed.
- A lot of money is being spent into product development, need for more effective usage of this huge amount of data

Figure 14. Free comments about the knowledge sharing

4.3 Knowledge survey

The knowledge survey contained 29 questions and it was distributed globally inside the organization. The survey was created with the co-operation of the organization´s project managers, technology manager and operation and excellence manager.

The research questions examine what the main pain points in knowledge sharing are, and how we can increase the knowledge reutilization inside the case company's organization. The knowledge survey was distributed globally, but most of the people who answered to the survey were from Finland (65%). The total number of people who answered to the survey was 141. From the 141 people, the biggest group of respondents were from software development (18%). The second group was product management (13%) and the third project management, technical support, product development (mechanical design), all with the same percentage of 8%.

In the survey analysis, the scaling for questions that show the results as average score are shown as following:

Scaling	Value
Excellent	5
Very good	4
Good	3
Fair	2
Poor	1

Figure 15. Average score scaling

The two major groups that have been compared are product development and product engineering. The reason for selecting these two groups are that they are the employees who are supposedly sharing and reusing the knowledge.

4.3.1 Local and global communication

Users intensively are in cooperation with local operations. 75% of the people are in daily cooperation with their local design / competence area. This result shows that the cross business unit´s co-operation does not play a big role in daily work. Knowledge is shared mostly inside local business units.

The communication is done through networking and with e-mails, and therefore it is important to know the right persons to contact with.

4.3.2 Knowledge of tools, designs and documentation

Your level of knowledge about documentation in you competence area?	
Area	**Average score**
Product development	3,5
Product engineering	3,3

Figure 16. Knowledge of documentation

Your level of knowledge about tools to your competence area?	
Area	**Average score**
Product development	3,7
Product engineering	3,4

Figure 17. Level of knowledge about the competence area tools

4.3.3 Awareness of knowledge sharing organization

Figure 18. Knowledge sharing community

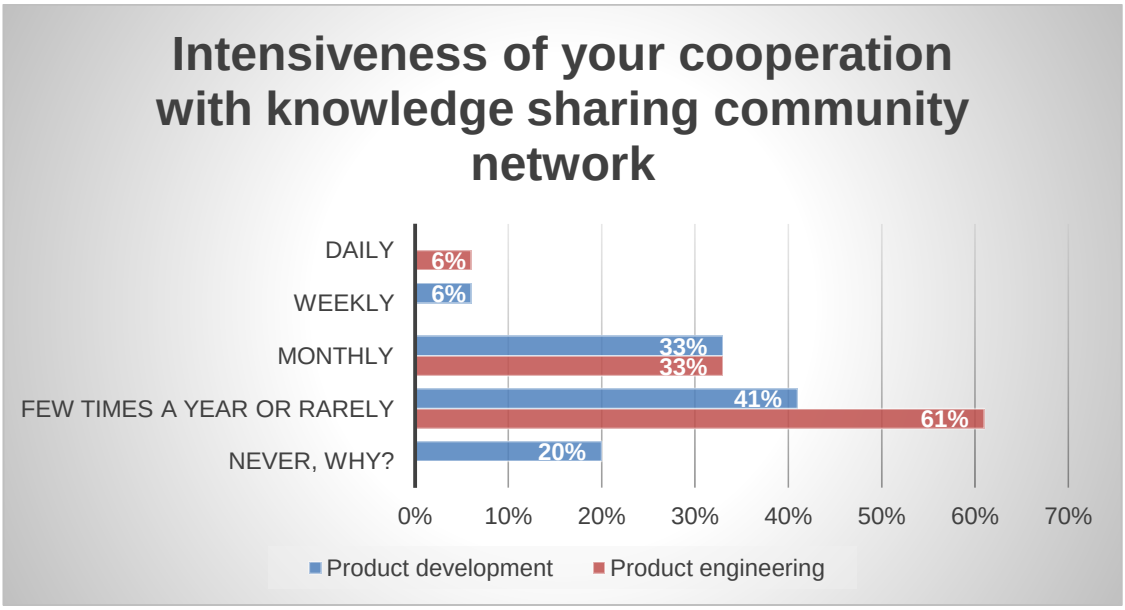

Figure 19. Knowledge sharing intensiveness

4.3.4 Main pain points

What are the main issues if you are not reusing knowledge	N
Cannot find material / information easily	25 = 35%
Too many platforms where to store information	18 = 25%
For knowledge sharing communication is the key, not tools	1 = 1,5%
The systems are not user friendly	11 = 15%

Figure 20. Main issues in knowledge reutilization

The percentage amount is calculated from N divided with the total amount of the answerers. From all the respondents (72) who answered to this specific question 75% of answerers had the similarities with three questions as shown in figure 22. Those are the main issues that should be taken into consideration.

4.3.5 What knowledge should be found in the platforms

What kind of knowledge should be found from the information systems?
More common information
Metrics
Design material (guidelines, instructions)
Lessons learned
The experts of specific area
Good practices

Figure 21. Wanted types of knowledge from users

4.4 Conclusions

As seen from the figures, all the respondents and their observations are focused on the confusion of where to find the information and how to search for the needed information. The issue that causes the most confusion seems to be that the end users do not know where to find the required information. There is uncertainty of where to store the information into the various different platforms and the usage purpose for each of the different platforms.

Two major pain point when sharing knowledge
- Can't find material / information easily
- Too many platforms where to store information

Figure 22. Two major pain points when sharing knowledge

Avg. score no.	Scaling explanation
5	60 minutes to several hours
4	30 to 60 minutes
3	15 to 30 minutes
2	Less than 15 minutes
1	None

Figure 23. Scaling explanation

Definition	Product development avg. score	Product engineering avg. score
Knowledge capture	3,2	3,4
Knowledge share	3,3	3,4
Knowledge utilization	4,1	3,8
Knowledge reuse	3,7	3,5

Figure 24. How much time used in knowledge sharing and reutilizing activities on a 7.5 hour workday

Here are some questions to consider based on the gathered data. Is the data being collected into right places in a right way? Where does the information end up into? Is the information distributed only locally and mostly face-to-face? What is the level that the organization wants to be on?

5 Proposal

In this chapter, the proposal is a suggestion how to take the next steps on improving the knowledge sharing and reutilization. The proposal will be based on the current literature and today's best practices with identifying the already existing good elements inside the organization and issues that require improvement.

5.1 Improvement proposal

Today's literature and best practices point out five ways to improve the knowledge sharing and reutilization process inside the organization. The case improvement proposals are presented below.

5.1.1 Build your office space to be conductive to knowledge sharing

When looking at a fast food restaurant, the environment encourages people not to have discussion. The purpose is to move the people through the establishment as fast as possible. Everything is tightly packed, uncomfortable seating, dividers between spaces. This is something that should be avoided in office spaces. Also coffee vending machines

should be placed not only in the kitchen area and also in casual meeting spaces. This will increase the chance that employees will sit down and have a quick chat.

5.1.2 Encourage various forms of knowledge sharing

Be sure to identify people with their various gifts. Not everyone is perfect at speaking in public, not everyone feels comfortable with sharing their written work, designs, and graphs with the whole organization. Here are a couple of ways how to make everyone feel comfortable sharing their knowledge.(Dana Yongren, 2015)

Make time for face-to-face co-operation. Book meetings where you can bounce ideas to each other and make the meetings happen weekly or monthly. In this kind of situation the experienced and those who feel comfortable will act as role models to persons who are shyer. (Dana Yongren, 2015)

- Schedule off-site events. It is important to get away from the regular work space. Sometimes all it takes is fresh environment to start the new collaboration. .(Dana Yongren, 2015)

5.1.3 Incentivize knowledge sharing

Remember to reward your employees. Whatever way you decide to reward employees for their active knowledge sharing, it will inspire people to kick start some next step collaboration and encourage people to be innovative and even more active in knowledge sharing. .(Dana Yongren, 2015)

How to reward employees if not with money? To have an aspect about internal rewards, intrinsic motivation offers a good aspect on that. Intrinsic motivation refers to behaviour that is driven by internal reward. Psychologically intrinsic motivation separates internal and external rewarding. If you are pursuing activity out of pure joy to it, you are then

intrinsically motivated. The desire arises from your sub consciousness, not with the desire to have some kind of material reward e.g. money. These type of activities are for example participating in volunteering or church events. This gives people meaning and they do not seek for rewards (Intrinsic Motivation 2018)

For example, when small children play with their toys and they are given new toys to play with, what seems to happen is that the interest towards the new toys decreases. In that case it is opposite to the enjoyment of the reward with a new thing, so that will not increase the motivation. It is important to note the surrounding factors, as they might in some cases decrease due to the external rewarding. Other surrounding people might gaze the winner's prize as a token of exceptionalism and competence or even as bribery or coercion. It is all a matter of the individual's view of different things, people are different. It is important to sometimes do something by not only trying to gain money, but do things to keep your life in well balanced situation. (Intrinsic Motivation, 2018)

5.1.4 Revamp your training and on boarding methods

New employees spend most of the time acquiring the needed knowledge, arranging trainings to assist the new employee in getting into to the game faster. You lose valuable time if the newly hired person cannot share the knowledge that would be valuable. .(Dana Yongren, 2015)

- Assign a mentor to each new employee. This will have a huge impact if the mentored and the mentor form a successful relationship. To acknowledge that there is a person to go to with questions, creates a much wanted boost in confidence and makes them act more courageously in a new working environment.

- For job shadowing, choose a person, not the superior from the team and allow them to follow you for a day or two to see how they work. This will make the ways

of working in the new job position easier to understand. It sends a message that in a flat organization all are equal and can raise their concerns without hesitation.

- For a new employee, arrange a readymade access to all the needed software that the position requires. When accessing all the platforms it would not give the new user “access denied”. Dynamic grouping is recommended, which will enable smooth accessibility to all needed software.

5.1.5 Find knowledge sharing software that is right for your organization

Select a working knowledge sharing platform, if you keep asking the same questions from yourself or spending enormous time on specific content. With a good knowledge sharing platform you can easily share content, ask questions and create conversations, identify the area experts, save documents, and show your processes. In addition, the platform encourages all employees from trainees to CEOs to share ideas and thoughts. (Dana Yongren, 2015)

5.2 Further considerations

Based on the research results, the next steps for the case company would be to focus on the improvement and development of the current knowledge sharing platforms and not to implement new solutions with such a haste. The content search ability and the transparency of the knowledge need more focus.

Now the knowledge is many times in the heads of the experts and not documented into the systems. What happens if the person with the important knowledge is no longer available for some reason, and the knowledge vanishes with him? The challenge is to transfer the knowledge from tacit to explicit. At least keep the tacit knowledge flowing from person to person by increasing the pair working, so that the knowledge will flow automatically. For example, an experienced designer outside the company starts as a new employee in the organization. The person has valuable knowledge from outside the company. By pairing these designers together they will share ideas and new ideas might pop-up, and efficient knowledge may flow.

The need for self-criticism when doing everyday work is a much needed aspect. Do not only have the mindset that in a big technology firm we have the only knowledge for doing these things, but gather and benchmark information actively outside the organization.

When employees visit other sites and organizations, make a summary of your visit and share it with others inside your organization. Tacit knowledge will flow more efficiently through organizational barriers than explicit. Do not forget to pay attention to the cultural aspects.

Currently double work is being done too much. The reason is that people see their way to work as the only true and right way to do things. Have a look at the existing or successfully proven solutions and use as much copy pasting from existing archives as possible. Do only minor changes to adjust them to suit your needs.

People who should be the active knowledge sharers and reusers are the employees of the product engineering and product development. Bring the existing designs available to all designers, requirement management available for all designers, model based design. When organizations change, the information systems are in a relevant role. Information stored in the information systems will guarantee that the information is not lost when people are moving cross organizations.

There is a need for communication plans and good documents to guide how to work efficiently when sharing and reusing the knowledge. Create an entry-level site that lists thoroughly the content of the different software platforms inside the organization.

Start with local experiments, expand it into global use when proven successful. Avoid doing the work with “coffee corner groups”. Expand and make your work more transparent to the whole organization. There is no need to grant access to all users to all software inside the organization, but bring awareness on what is out there to the users. It will avoid doing double work.

Do not first search for new software and platform to your problem, have a good look at the existing ones and see if they will fit to your needs, even with a small customization. As seen on the survey and interview results, there is too much to choose from already.

Think about the big picture. If the new software will only solve your team's problem, what will it do to the global organization?

Smart companies proactively avoid the knowledge silos, because these silos prevent the employees from getting the much-needed information. When there occur delays in communication that will prevent good opportunities from slipping through your hands and it reflects in the company revenue. Productivity suffers, when employees are doing the already existing things again and again. When employees are not totally sure and guessing on what is the right solution or by receiving wrong information. (Jessica Greene, 2018)

How then to avoid these silos? The first is for management to have a look at their knowledge sharing methods, if they work and are considered as top priority. The management should build a culture inside the organization that sends the message that knowledge sharing is top priority.

Avoiding routine learning	**Making learning as a routine is beneficial. It will clear the room for fresh knowledge in a busy work environment. In a platform suitable for lessons learned will effect to employees continuously search for improve their performance.**
Slow decision making	Make fast decision making part of the company culture, encourage everyone to keep their responsibilities and actively check the status of their responsibility area.
Users can't access the needed information	Connect information to employees predictively and in to the needed context. This will affect on training the new employees local and off-site
Make same mistake twice	By creating an open community to share knowledge transparently encourages the employees to share their knowledges including failures.
Ignoring company's best problem solving practices	Establish a process to define, communicate and replicate the successfully proven solutions. These proven solutions can then be presented in the employee training system.

Figure 27. Non beneficial things in knowledge creation, Andra Postolache

5.3 Reducing the waste

The calculations used in this thesis are not based on the case company's actual costs. The robust figures are used just to give an example of possible amounts that the case company might be dealing with.

These calculations are valued as non-valuable work for the company. Here is an example: If the value of waste work is 1 hour per day / employee and we remove half of the waste time, the cost saving in a month for 1000 employees would be 1M€.

Thoughts: What would be the time saving and value added to operations, if increasing the capture, reuse, utilization and share 30 minutes per a day for each employee? This would reduce waste work, help reusing a good quality and reliability solution and finally get the product faster to the market.

To justify these robust costs, a Master's thesis was written on a similar topic simultaneously during this research and the euro costs were similar.

6 Summary

The objective of the thesis was to research, what the main paint points are when sharing and reutilizing knowledge inside the case company. The need for this was discovered on the basis that the organization needed concrete data on the current status why the knowledge sharing is not on a level where they want it to be. Also customer feedback on the new information systems that have been implemented lately acted as a trigger to start researching for the main issues what the organization is dealing with. In an organization like ABB Drives Oy, the need for fluent knowledge sharing and reuse play a big role in the everyday work environment.

At the beginning of the research, the objective and the scope for the project were defined. After that, today's literature was analysed to point out the proven good practices from a theoretical aspect.

In the current state analysis, the objective was to gather concrete data on the current situation and the problems that the employees face in their everyday work. Based on the literature study and the current state analysis, the proposal was created with the good elements that the company already possesses and the needed improvements based on today's literature.

The thesis was a very interesting research project to work with. The research work as a whole was clearly scoped and had a good amount of challenge to work with. The case company offered all the needed support to deliver the end result. The working environment and know-how inside the organization was innovative and the people were really enthusiastic to participate in interviews and give honest feedback on the current situation.

In the future, the company will have concrete data how to proceed with the actions seen fit on how to improve the two main pain points: bring information more easily accessible and make the current platforms more user-friendly.

References

Groff, Jones, 2003 Introduction to knowledge management, Burlington: Elsevier Science

Nonaka,Toyama, Konno, 2000 a unified model of dynamic knowledge creation, Burlington: Elsevier Science

Chun Wei Choo, 2006 The knowing organization: Oxford, Oxford University Press, 2006

Krough, Ichijo, Nonaka, 2000 Enabling knowledge creation

ABB, ABB introduction,www.abb.com, Accessed on 23 April 2018

Olivia Hernández-Pozas, What is cultural knowledge and how we can use it, 2013 <http://www.oliviahdzp.com/2013/08/07/what-is-cultural-knowledge-and-how-can-we-use-it/> Accessed on 23 April 2018

Ofer Kahane, Avoiding KM Pitfalls, <http://www.tudog.com/pdfs/articles/Avoiding%20KM%20Pitfalls.pdf> Accessed on 22 May 2018

ABB, ABB Organization, <https://new.abb.com/fi> Accessed on 28 June 2018

ABB, ABB Oy organization, <https://new.abb.com/fi/abb-lyhyesti > Accessed on 28 June 2018

ABB, ABB Organization, < https://new.abb.com/about > Accessed on 28 June 2018

Dave Bourgeois and David T. Bourgeois, What Is an Information System? https://bus206.pressbooks.com/chapter/chapter-1/ 16 July 2018

Dana Yongren ,5 Ways To Increase Knowledge Sharing In Your Organization, 2015,< https://bloomfire.com/522359-5-ways-to-encourage-knowledge-sharing-within-your-organization/ > Accessed on 16 June 2018

Avoiding KM Pitfalls, (http://www.tudog.com/pdfs/articles/Avoiding%20KM%20Pitfalls.pdf) Accessed on 17 July 2018

Kendra Cherry, Intrinsic Motivation 2018, < https://www.verywellmind.com/what-is-intrinsic-motivation-2795385 > Accessed on 17 July 2018

Jessica Greene, Avoiding knowledge silos< https://www.askspoke.com/blog/knowledge-management/avoiding-knowledge-silos/ > Accessed on 2 August 2018

Andra Postolache, 10 Ways Not Sharing Knowledge Impacts Your Company, 2017, <http://www.quandora.com/10-ways-not-sharing-knowledge-impacts-your-company/> Accessed on 28 August 2018

Appendix

Date	Agenda	Participants	Duration
28 May 2018	Coffee break interview, free discussion	Project manager and Pekka Bremer	30min
12 June 2018	Coffee break interview, free discussion	Development manager and Pekka Bremer	60min
12 June2018	Coffee break interview, free discussion	Quality Director and Pekka Bremer	60min
19 June 2018	Coffee break interview, free discussion	R&D Team Manager and Pekka Bremer	45min
29 June 2018	Coffee break interview, free discussion	Senior Software Designer and Pekka Bremer	60min

Appendix 1. Coffee break interview schedule

Date	Agenda	Participants	Duration
1 February 2018	Knowledge survey meeting kick-off. Draft our ideas about the survey into to a memo	TMO Manager, Project manager, Quality and opex, Pekka Bremer	1h
12 February 2018	Knowledge survey creation follow-up. Have a look at the first draft and make needed changes	TMO Manager, Project manager, Quality and opex, Pekka Bremer	1h
6 April 2018	Finalize the content of the survey.	TMO Manager, Project manager, Quality and opex, Pekka Bremer	1h
11 April 2018	Last minor changes for the release	Project manager, Quality and opex, Pekka Bremer	1h

Appendix 2. Knowledge sharing survey planning schedule