SHARING KNOWLEDGE OVER COMPANY BORDERS

Managing Knowledge in Key Customer Relations at ABB Sweden

Tommy Andersson and Tom Westerlind
Titel/Title
Sharing Knowledge over Company Borders – Managing Knowledge in Key Customer Relations at ABB Sweden

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Sammanfattning/Abstract
This master's thesis is about how to share knowledge with key customers. It is the result of a study done in cooperation with ABB Management Consultants, an internal management consulting service provider for ABB Sweden. The purpose of the thesis is to provide knowledge practitioners managing inter-organizational knowledge sharing with a method to support their work, The Knowledge Situation Model, and also to provide them with an insight in how to apply it. The method is adapted to be used in knowledge management situations where focus is on leveraging existing knowledge in key-customer relations. Two case studies were also done, aimed at improving the exchange of knowledge between ABB and the customers in the cases, and also to test the applicability of the model.

We have in our study used both an inductive and a deductive approach. First in the generation of the Knowledge Situation Model, we started with an inductive approach when concluding the model from analysis of a number of written sources. Then, to verify the applicability of the model, we used a strict deductive approach as we in the case studies tested the models and drew conclusions from the results. We have in our thesis had an explorative approach that we assimilate with a cross-sectional, qualitative literature study. The study is qualitative because of the complex issues that involved in the management of knowledge. In testing the applicability of the methodology, we have also conducted two qualitative case studies.

As a result of the first case study, we suggested that the customer and ABB were to start sharing knowledge about bugs and defects on products delivered by ABB.

We have concluded that the organization, people, the knowledge, the customer relation and the systems all play important roles for inter-organizational knowledge sharing between a supplier and his key customers. Therefore they form the five dimensions of our model, the Knowledge Situation Model. We also see the activity of managing knowledge as an iterative cycle, encircling the Knowledge Situation Model.

Important conclusions for the model have been that:
- The availability, applicability and transferability of knowledge determine how to share it.
- The organizational structure, leadership and incentives should be designed to support knowledge sharing.
- A knowledge sharing culture and compatible frames of reference are essential for successful knowledge sharing.
- The technological and knowledge, and legal bonds of a customer relation create incentives for and social and logistical bonds simplify knowledge sharing.
- Media for knowledge sharing should have appropriate richness for high quality and efficient knowledge transfer.
- Quantitative and qualitative measurements are needed to evaluate the intangible values of knowledge sharing.

Nyckelord/Keywords
Knowledge management, knowledge sharing, customer relations, organizational learning
Abstract

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*The Cycle of Knowledge Sharing*
Sammanfattning

Detta examensarbete handlar om hur man delar kunskap med nyckelkunder. Det är resultatet av en studie gjord i samarbete med ABB Management Consultants, en för ABB Sverige intern konsultfirma.

Syftet med examensarbetet är att förse den som praktiserar knowledge management i kundrelationer dels med en analysmetod, dels med en insikt i hur den skall användas.

Metoden är framtagen för att användas när huvudsyftet är att dela existerande kunskap i en nyckelkundrelation. Studiens två fallstudier syftade till att förbättra kunskapsutbytet mellan ABB och fallstudiernas kundföretag, men även till att testa metodens användbarhet.

Vi har i vårt arbete använt oss av både en induktiv och en deduktiv ansats. I framtagningen av vår analysmodell, ”Kunskapssituationsmodellen” (The Knowledge Situation Model), använde vi en induktiv ansats när vi utifrån analys av en mängd litterära källor. Därefter, i valideringen av samma modell användes en deduktiv ansats när vi i fallstudierna testade modellens användbarhet och drog slutsatser därav.

Vi liknar vår explorativa ansats vid en kvalitativ tvärsnittslitteraturstudie. Ansatsen är kvalitativ pga. ämnets komplexitet. För att pröva Kunskapssituationsmodellens användbarhet har vi även genomfört två kvalitativa fallstudier.

Som resultat av den första fallstudien föreslog vi att kundföretaget och ABB skulle börja ett utbyte av kunskap om fel och defekter på de produkter som ABB levererat till kunden.

Vi har dragit slutsatsen att organisationen, människorna, kundrelationen, och systemen alla har stor betydelse för ett kunskapsutbyte mellan en leverantör och dennes nyckelkunder. Som en följd av detta utgör dessa faktorer även dimensionerna i vår analysmodell, Kunskapssituationsmodellens. Vi ser även aktiviteten att bedriva knowledge management som en iterativ process som cirklar runt modellen. Denna process kallar vi ”Kunskapsdelningscykeln”.

Vi har bland annat dragit följande slutsatser om modellens dimensioner:

- En kunskaps tillgänglighet, applicerbarhet och transfererbarhet avgör hur den borde delas
- Organisationsstrukturen, ledarskapet och incitamenten bör utformas för att stödja kunskapsdelning
- En kultur av kunskapsdelning och kompatibla referensramar är nödvändiga för framgångsrik kunskapsdelning
- En kundrelations juridiska, tekniska och kunskapsmässiga bindningar skapar incitament för kunskapsdelning, medan sociala och logistiska bindningar underlättar densamma
- Media för kunskapsdelning bör vara av lämplig rikhet för att få hög effektivitet och kvalitet i en kunskapsöverföring
- Kvalitativa och kvantitativa mätetal är nödvändiga för att uppskatta de immateriella värden som kommer av kunskapsdelning
Résumé

Ce mémoire concerne les moyens pour le praticien de partager les connaissances avec des clients-clés. Il est le résultat d'un travail effectué en coopération avec ABB Management Consultant, un bureau interne de conseil pour ABB Suède.

L'objet de ce mémoire est de fournir aux pratiquants de la gestion du savoir entre les organisations une méthode, "le modèle des connaissances basé sur la situation", pour supporter leur travail, et pour leur donner une compréhension de la manière servant à l'appliquer. Le modèle est adapté pour être utilisé dans des situations de Gestion du Savoir où l'importance est de transmettre des connaissances existantes au travers d'une relation avec le client-clé. L'objectif des deux études de cas étaient d'améliorer l'échange des connaissances entre ABB et les clients concernés mais également de tester et de valider l'application du modèle.

Nous avons dans notre étude utilisé non seulement une approché inductive, mais également une approche déductive. En construisant le modèle, nous avons commencé avec une approche inductive, en extrayant le modèle d'analyses de nombreuses sources littéraires. Puis, pour vérifier l'application du modèle, nous avons utilisé une approche strictement déductive en testant cette application dans deux études de cas à partir desquelles nous avons pu tirer nos conclusions. L'approche exploratoire utilisée a été associée à une étude littéraire transversale qualitative. Celle-ci est qualitative à cause de la complexité de la gestion du savoir. En testant l'application du modèle, nous avons également effectué deux études de cas qualitatives.

Comme résultat de la première étude de cas, nous avons suggéré que ABB et le client-clé commencent un échange basé sur l'information concernant les types de défauts dans des produits distribués par ABB.

Nous avons conclu que l'organisation, les hommes, la connaissance, la relation avec le client et les systèmes jouent tous des rôles importants pour un partage des connaissances dans une relation avec le client-clé. C'est ainsi qu'ils constituent les dimensions dans notre modèle "le modèle des connaissances basé sur la situation".

Nous sommes convaincus que la gestion du savoir n'est pas un processus unique mais un cycle itératif perpétuel qui tourne autour du modèle.
Parmi les conclusions tirées du travail se trouvent les suivantes:

- La disponibilité, l'applicabilité et le transférabilité d'une connaissance décide la manière dont celle-ci doit être partagée.

- La structure de l'organisation, l'encadrement et les incitations doivent être adaptés à la situation pour soutenir l'échange de connaissances.

- Une culture pour l'échange des connaissances et des cadres de références compatibles sont essentiels pour le succès d'un tel type d'échange.

- Les liens sociaux, les liens de logistique et d'administration d'une relation client-clé simplifient, et les liens légaux, technologiques et de connaissance donnent des incitations à, l'échange des connaissances.

- Le media pour le transfert des connaissances doit être suffisamment riche pour l'assurance d'un transfert efficace et de haute qualité.

- Des mesures quantitatives et qualitatives des valeurs immatérielles et matérielles sont nécessaires pour mesurer la valeur de la gestion du savoir.
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1 Introduction

In this chapter we give a brief introduction to the thesis and to the authors. Then we also give suggestions and directions about how to read it.

1.1 Why has this report seen the light of day?

This report is the master’s thesis that completes the two authors’ Master of Science degree at Linköping Institute of Technology at Linköping University1.

1.2 What is it about?

This master's thesis is about knowledge management. As the title suggests, it treats how to share knowledge over company borders with key customers. It is the result of a study done in cooperation with the company ABB Management Consultants2, an internal management consulting service provider for ABB, the electrical engineering corporation (see chapter “Background”).

1.3 Who are the authors?

Tommy Andersson is 26 years old and from the western parts of Sweden. Tommy has studied Industrial Engineering and Management3 at Linköping University. He has worked as a Business Consultant for EDS in Sweden and ABB Informatik in Germany, and he has previously also studied in Germany.

Tom Westerlind was born 25 years ago in Farsta outside Stockholm. He is a student of Industrial Engineering and Management International3 at Linköping University since 1994. He has previously studied at Stockholm University and Ecole Polytechnique Fédérale de Lausanne in Switzerland.

1  For more information see www.liu.se
2  For more information see www.abb.se/mac
3  For more information see www.island.liu.se
1.4 Suggestions for reading

To make it easier for the reader, we have in the beginning of each chapter placed a short text that explains the content of the specific chapter.

For the busy reader, there are summaries of the thesis in English, Swedish and French at the very beginning. We recommend also the summaries at the end of chapters 6 through 13, which are the chapters that have mainly theoretical content. The “Conclusions” chapter is also something of a summary of the most important findings of the thesis.

For the reader interested in the models and tools that have been developed in this thesis, the most interesting chapters are chapter 8, “The Knowledge Situation Model”, through 13, “The Cycle of Knowledge Sharing”. Chapters 1, “Introduction” through 6, “Knowledge and intangible values” are not as central when it comes to models and tools.

For the knowledge management practitioner who intends to use some of the models or ideas, we recommend the case studies in chapter 14 and 15, which also serve as examples of how the models can be applied in practice. Here the reader can see how the analysis according to the model is arranged and also find out about the reasoning behind the work in the case studies.

If the reader has a special interest in any of the theoretical areas covered in chapters 6 through 13, it is possible to read just that chapter about the specific area. The theoretical chapters do not depend upon each other, and can therefore be read separately, although they frequently refer to each other.

1.5 Reading directions

We have in writing this thesis been careful to distinguish between when we claim or draw conclusions from something, from when we quote a source.

When referring to a source, we have been careful in the placement of the actual reference. A reference placed before the punctuation of a sentence refers only to the specific sentence, but a reference placed after the punctuation refers to the entire paragraph.

If we use material from a source that we have modified, we clarify this by adding “adaptation from” to the reference.
All text in the case studies that contain our analysis is in italic to distinguish it from text that only recapitulates facts. Elsewhere in the thesis, we mark our own analysis with “we believe” or similar expressions to clarify its origin to the reader.
Sharing Knowledge over Company Borders

Tommy Andersson and Tom Westerlind
2 Background

This chapter is thought to give the reader a background to the report and the setting of the thesis. We give an introduction to our view of the fast changing global business environment, and we also present ABB in brief.

Whereas at one time the decisive factor of production was land and later capital...today the decisive factor is increasingly man himself, that is, his knowledge.

Pope John Paul II, from the 1991 Centesimus Annus

2.1 A changing world

Still in the nineteenth century, countries and people’s wealth was built on land and raw material. He who controlled the land and the raw material also controlled the economy. Thus in the old days, the fortunes of kings and landlords where built on their possessions of land. Later came the likes of Rockefeller and the sultan of Brunei whose fortunes are built on access to natural resources, in their case oil.

Then came the industrial revolution that altered the rules of the game. A new kind of industrialists without significant land or raw material possessions grew more powerful. They came to control capital that could buy the raw material and the land they needed. Instead of land and raw material being the main source of wealth, that role was taken over by capital.

In today’s business world capital is becoming a commodity that is traded on the world's capital markets. He who has knowledge and the ability to apply it to business can “buy” capital on the capital market, trading a part of the profit potential for capital to invest in industrial capacity, land and raw material. The world has entered the next era, the information era. In the information era knowledge is the main source of wealth. He or those who have the knowledge will ultimately also have the competitive advantage.

"Knowledge has become the preeminent economic resource—more important than raw material; more important, often, than money." (Stewart, 1997)
Knowledge is becoming a part of the products we buy, a computer for example is made mainly from silicon, plastic and glass. The cost for the silicon, plastic and glass in the computer is a miniscule portion of the price that a consumer pays for the computer. What the consumer pays for is the knowledge invested in the product, i.e. all the time and knowledge that the electronic engineers, programmers, production planners, etc, has put into it.

As information travels faster and business becomes more international, knowledge from all over the world becomes more and more accessible. Having access to more knowledge makes the business community more conscious about the quality and freshness of knowledge. Therefore at the same time as the importance of knowledge increases it becomes obsolete faster than ever. The half-life of knowledge, the time in which the value of a specific piece of knowledge is halved, is rapidly shortening. For example it is estimated that the half-life of the knowledge of an engineer fresh out of engineering school is about four years (Thurow, 1998).

In an economy were knowledge is the preeminent resource, and a volatile such to that, special care must be taken to manage this valuable asset. According to several authors, knowledge and the ability to create new knowledge is now the most important source of competitive advantage.

2.2 Our focus

The focus in this the thesis will be put on managing knowledge with customers. It is becoming more and more prioritized in businesses to interact with the customers. Companies of today are becoming better and better at learning from their customers. Companies are more and more starting to value their customers’ views, and use them to develop their own business.

A good example of this is the North American competitor of ABB, General Electric. GE has a customer call center that handles more than 3 million customer calls a year. The call center does not only provide service to the customers, but it also extracts knowledge about the customers and their preferences from each customer contact. The acquired knowledge is then provided to where it is mostly needed, e.g. in product development or customer service.

In a recent survey (Information Strategy Magazine, No. 6 1998) about knowledge management among high-level European business managers, 87% of them ranked “customer needs and preferences” as a very important critical knowledge in their companies. The remainder, some 13%, ranked it as important. The survey also showed that 62% of them believe that the knowledge about the customers’ needs
and preferences is already in their organizations, residing in their employees’ heads.

According to another survey of over 200 senior Fortune 1000 companies this is also the case in North America. Here follows a quote from the North American survey.

> What is lacking, according to many executives surveyed, are the internal processes and practices needed to integrate valuable information [and knowledge] and get it there where it can be used effectively. (Cole, 1996)

After discussions with ABB’s Swedish market organization it was confirmed that this also is a highly prioritized area at ABB. Therefore it was decided that the focus of this thesis was to be the management of knowledge about, and in interaction with, the customers.

### 2.3 Introduction to ABB

In 1987, ASEA of Västerås, Sweden (founded 1883) and BBC Brown Boveri Ltd. of Baden, Switzerland, (founded 1891) merged to form ABB\(^4\), Asea Brown Boveri Ltd. The company headquarters are in Zurich, Switzerland.

Revenues for 1997 amounted to 31,265 MSEK and the group employed some 213,057 employees. The main segments are power generation, power transmission and distribution, industrial and building systems and financial services.

The Power Generation segment makes power generation systems for utility and industrial use. Power Transmission and Distribution makes a range of systems and products for transmission and distribution of electrical energy. Industrial and Building Systems\(^4\) supplies products, systems and services for industrial processes and building systems. Financial Services\(^4\) handles financial services for ABB and external clients.

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\(^4\) For more information see www.abb.com
Sharing Knowledge over Company Borders

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3 Thesis scope

In this chapter, the scope of the thesis is presented, together with the products it is supposed to deliver and the delimitation of the project.

The scope of the thesis is to provide knowledge practitioners\(^5\) managing inter-organizational knowledge sharing with a method to support their work and to provide an insight in how to apply it. The method is to be used in knowledge management situations where focus is on leveraging existing knowledge in key-customer relations.

3.1 Thesis products

The thesis is intended to have three major products, one general product and two case products.

The general product is a defined and tested method for the management of knowledge sharing in the relation between a major supplier and a key customer, in order to create value for both parts by better utilizing existing knowledge.

The case products aim at improving the exchange of knowledge between ABB and the customers in the two case studies. For case one, the case product consists of a proposal that has been presented to and discussed with ABB and the customer. The proposal suggests how to implement a solution designed to improve the exchange of some knowledge between the different ABB companies, the ABB customer team and the customer in the case study. As for case two, the case product is a description and an analysis of the knowledge situation, aimed at improving the exchange of knowledge between the customer in the second case study, the different ABB companies selling to the case study customer and ABB’s customer team.

\(^5\) We see knowledge practitioners as anyone practicing knowledge management, which is somewhat different from the strict definition of the knowledge practitioner which Nonaka & Takeuchi (Nonaka & Takeuchi, 1995) use.
3.2 Delimitation

The focus for this thesis is inter-organizational knowledge sharing. Hence, the results are neither adapted for creating new knowledge nor for securing existing knowledge, although many of its components are applicable on those situations too.

The master’s thesis study is delimited to two case studies involving two customers and two customer teams.

The case studies are delimited to the interaction between the companies that sell to the customers in the case studies, the customer teams and the customers. We exclude all other customers and all other ABB companies than those selling to the case study customers.

Additional minor delimitations will be presented in some chapters to clarify what we include and do not include in these parts.
4 Method

This chapter is used to describe the way in which the work on the thesis has been carried out, in detail and in broad terms. First, we present our view of science and how it has affected us in the study, and then we continue with the scientific approach of the study. Finally, we describe the method with which the Knowledge Situation Model was developed.

The purpose of this chapter is to give the reader an opportunity to question the report. In order to do so, we present our view of science and describe in detail how we conducted the study. In describing the method, we hope to make it easier for the reader to judge the conclusions drawn in this report and understand when the findings are applicable.

4.1 Our view of science

What separates scientific knowledge from other knowledge is the way in which the knowledge is acquired. Scientific knowledge is acquired systematically and in a structured way. (Holme & Solvang, 1991) To present our view of science, we state below our view of society and the ethic principles connected to scientific work.

4.1.1 View of society

Our opinion is that there might or might not be an objective view of society. It is impossible to find out, as all of us view society differently and subjectively. We are affected by previous experiences (cf. “Knowledge ambiguity” in chapter “The knowledge dimension”) that have formed opinions and prevent us from viewing facts objectively. We have in order to limit the effect of our subjectivity been careful in the writing of this thesis. We state clearly when we claim or quote something so that the reader can draw his own conclusions.

4.1.2 Scientific ethics

We believe that a scientific study should be trustworthy, understandable and interesting. The purpose must be trustworthy to the reader in order to persuade him of the results and the reasoning. A study must for two purposes also be understandable. First, the reader must be able to take advantage of the results of the study, and second, the study must be understandable enough so that no misinterpretations of the results are made.
“Write so that your enemies can’t misunderstand you, and so that your friends can understand you.” (Wiedersheim-Paul & Eriksson, 1991)

Finally, the study must also be of interest to the scientific community (Wiedersheim-Paul & Eriksson, 1991).

We have tried our best to live up to these three “musts”. We hope that this chapter helps the reader to evaluate the trustworthiness of the study. We have tried to help in the understanding of the study by using clear definitions and a good language. Finally, by having chosen a relatively unexplored subject, we hope that the study has also become interesting to the reader.

There are also a number of ethical ideals that a scientist should cherish: (Mårtensson & Nilstun, 1988)

A study must cherish the ideal of ethics, so that no one gets hurt because of the study.

We have let our primary sources remain anonymous to prevent this from happening.

To live up to the ideal of availability, a study should be written and published in such a way that anyone, even experts, can judge the result.

We will follow this ideal by clearly stating the source of everything that we claim, whether it is a written or an oral source, or if it is our own adaptation. We have also in the case studies used italic text to distinguish the results of our interviews from our analysis of these results. Then we will also, in the way that is customary, present and publish the thesis at our university, and in so doing the thesis becomes public material.

We believe that we have lived up to the ideal of availability by having paid attention to the language in the report and by having followed the rules for what is customary when publishing and presenting reports.

To live up to the ideal of relevance, the report is supposed to live up to the demands of contribution to science.

Knowledge sharing is a new and prioritized subject for many companies in which much is still to accomplish both in science and in practice (see also chapters “Introduction to knowledge management” and “Reflections”). By having written
the thesis not only about this subject but also with a new angle, knowledge management with key customers, we feel that we have ensured the relevance of the study. That is relevance both with regard to the contribution to science and the practical relevance for ABB.

The fourth and final ethical demand is to:

*Adapt established methods and demands for presentation and reporting*

In order to do so we use a customary format for the thesis and we use figures to clarify when necessary. We also present the detailed conduct of our study in the following section.

**4.2 Our study**

In order to make the study trustworthy, and to clarify the structure and classification of our work, we present in this section our explorative scientific approach.

**4.2.1 Scientific approach**

A scientific study can be explorative, descriptive, explanative or predictive. A central decision is what scientific approach to use for the study. An approach can be either *inductive* or *deductive*. With a strictly *inductive* approach, the researcher starts with observing a number of unrelated cases. Connections between the cases form conclusions which in turn form models and serve as base for theory. With a strictly *deductive* approach, the researcher starts with a model, and thereafter aims at justifying the model by observations and logical reasoning. (Wiedersheim-Paul & Eriksson, 1991; Lekvall & Wahlbin, 1993)

We have in our study used both an inductive approach and a deductive approach, because of our two purposes with the study. These two correspond to the generation of an analysis model and the application of the same model. First in the generation of the Knowledge Situation Model, we started with an inductive approach when concluding the model from analysis of a number of written sources. Later, when presenting the model and receiving feedback, we came to test the reasoning and findings of the model. This can probably also be seen as a deductive approach as it was a way to generate reactions to our model and then draw conclusions from them (see Figure 1).
When verifying if the model was applicable, we used an inductive approach, as we in the case studies tested the applicability of the methodology and then drew conclusions from the results (see Figure 2).

4.2.2 The approach of our explorative study

For every scientific study, there is an approach that explains how the study is made. The approach can according to Lekvall & Wahlbin include a cross-section study, a time series study or a case study. A cross section study is when a broad cross-section of a population is studied at one time. A time series study is when a study stretches over time and a case study is when an entire situation is analyzed. A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used. (Lekvall & Wahlbin, 1993; Yin, 1981)
The approach can also be *qualitative* or *quantitative*. A *quantitative* approach is when the results can be quantified, i.e. measured in numbers. A *qualitative* approach is when the results are too complex to quantify. (Lekvall & Wahlbin, 1993)

We have in our thesis had an explorative approach that we assimilate with a cross-sectional, qualitative literature study (see Figure 3). The study is qualitative because of the complexity of the many issues of knowledge sharing.

In testing the applicability of the methodology, we have also conducted two qualitative case studies (see Figure 4 and chapters “Case one” and “Case two”).

Both in Figure 3 and Figure 4 there is a small overlapping, in the case study and the cross section study respectively. The overlapping represents the unconscious effect that the case studies have on the generation of the model, and similarly that the theoretical studies have on the application of the model.

We explain and defend the choice of explorative approach in section 4.4.1, ”Criticism of the choice of method”.

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**Figure 3 Explorative approach when generating the model**

<table>
<thead>
<tr>
<th>Qualitative approach</th>
<th>Cross section study</th>
<th>Case study</th>
<th>Time series study</th>
</tr>
</thead>
</table>

**Figure 4 Explorative approach for applying the model**

<table>
<thead>
<tr>
<th>Qualitative approach</th>
<th>Cross section study</th>
<th>Case study</th>
<th>Time series study</th>
</tr>
</thead>
</table>
4.2.3 Collection of data

Data can be categorized in primary and secondary data. Although we have in our case studies and visits collected some primary data, we have for our conclusions primarily relied on secondary data. This makes the choice of literature central for the quality of our results and findings.

One of the problems with secondary data is that it sometimes has been collected for a different purpose, which makes it uncertain if its definitions and measures fit the own purpose. It can also be difficult to evaluate the quality of the data. A new subject, like knowledge management with customers, can make it difficult to find relevant information. (Lekvall & Wahlbin, 1993)

To find relevant written sources, we have consulted a number of qualified people. Our tutors at the university and ABB, researchers at Ernst &Young Center of Business Innovation, fellow thesis writers and colleagues at ABB have all contributed to furnish us with relevant information and sources. We have also tried to rely primarily on original sources and only cited secondary sources when we could not get hold of the original source.

4.3 The method

This section explains step by step how we came to the conclusion of the Knowledge Situation Model. If the reader is only interested in the result of the model, and not the process that led to it, we recommend him to continue reading in the next chapter, “Introduction to knowledge management”.

The knowledge situation model has been developed through a process involving literature studies, two case studies, a conference attendance and several interviews. We present in this section how we came to our conclusion (see also Figure 5 for illustration of the process).
The very first version of the model was our vision of knowledge management as an activity involving organizational theory and information technology. The information technology and the human issues had equal importance and the organizational dimension was divided up in structure, leadership, incentive structure and culture.

4.3.1 The Knowledge Situation Model

With this in mind, we started consuming considerable amounts of literature. After long discussions and numerous considerations, we came to the conclusion that many sources stressed the importance not to focus on IT, but on the people and organizational side of knowledge management. This made us form a new basis for our view of knowledge management.

We were convinced that the nature of the knowledge have great impact on how to perform knowledge management, as tacit and explicit knowledge must be transferred and managed differently. We also believed strongly that the
organizational issues of incentive structures and leadership were of considerable importance. Therefore we added the organizational part of the model, but we also wanted to put even more focus on the human side, the people side of knowledge management, and thus dedicated people its own dimension.

We saw IT as an important enabler, but still just an enabler, for knowledge management. We consequently removed it as a basis for the model. We also took the first step towards our model, and named it “The Knowledge Situation Model”, which at that time contained the three dimensions of knowledge, organization and people.

4.3.2 Specification of the dimensions

We had after further literature studies, for our first presentations at ABB defined the three dimensions in more detail. The knowledge dimension had been specified as knowledge location, partly because we had been reading about numerous knowledge mapping and yellow pages initiatives, and categorization, which still concerned tacit or explicit knowledge and other similar categorizations of knowledge.

The people dimension had been divided into languages, frames of reference, trust, incentives and culture. Judging from the literature, these were all important for knowledge management.

In the organization dimension, we outlined the important issues related to the organization to be organizational structure, strategy, existing systems, politics and leadership.

4.3.3 Knowledge sharing - a process?

When having formed a basis for our view of important dimensions of knowledge management, we felt the need to concretize further and link the Knowledge Situation Model to a practical knowledge management activity.

We started case one and tried to link our planned activities in Case one with the Knowledge Situation Model and came up with an idea of a process involving four steps. The four steps were needs, knowledge situation, solutions and result. The needs phase started the process to focus on but some important knowledge, something we had learned from tutors as well as from literature. The knowledge situation phase involved an investigation and an analysis according to the Knowledge Situation Model. The solutions would include solutions and specifying
how to measure and evaluate the initiative. The result part, the final step, included a value and cost evaluation according to the solution specification and the needs.

When presenting the model and receiving feedback from colleges and tutors, we felt the need to further group the different categories under each dimension, and link them more directly to the three main dimensions.

4.3.4 Specification of the content of the dimensions

The specification of the categories had the effect that we divided the frames of reference into difference in languages and interpretations, defined principles as politics (unofficial) and strategy (official). Culture was specified as understanding, altruism and trust, and leadership and incentives were linked to each other. The organization structure category grew into routines, groups, meetings, responsibilities and hierarchy. Finally the existing systems category was divided up into IT and knowledge mediators, which was an attempt to underline that non-technical systems of knowledge sharing were as important as the technical.

After a couple of comments by opponents and at presentations, we felt the need to connect the categories more strongly to the different dimensions of the model in order to give the model a more generic look and structure. This was done for all three dimensions.

The organization dimension came to include the categories structure, strategy & politics, incentives and leadership. As strategy was closely linked to leadership, and politics to culture, they later were removed from the dimension.

That left the people dimension with culture and frames of reference, although more and more aspects of culture and frames of reference came to our notice, we initially kept the previous sections.

The knowledge dimension (see chapter “The knowledge dimension” for definition) was equally further defined to include the availability, applicability and transferability of knowledge to connect to the systems of knowledge sharing. The availability was defined as the time, form and location of knowledge.

When removing the categories and connecting them to the dimensions of the model, the need for additional dimensions grew stronger. Both the cases and the literature stressed the importance of the nature of the inter-organizational relationship and the systems for knowledge sharing, and therefore they were to become two new dimensions in the model.
4.3.5 Customer relation

When conducting case one and reading about customer teams, key-customers and the customer capital part of intellectual capital, we saw the need to include the customer relation as a central part of the Knowledge Situation Model. It started out as a conviction of the importance of a Win-Win based knowledge sharing initiative that later was confirmed by numerous sources.

Literature about strategic suppliers, partnerships and the importance of the nature of the relationship for the value of the initiative for the involved parts, led to not only a customer relation dimension, but also a chapter about the value of knowledge management (see chapter “Knowledge and intangible values”).

To specify the nature of the customer relation dimension, we used the network view to explain the interest and simplicity of knowledge sharing between the organizations.

4.3.6 Systems for knowledge sharing

The cases together with the problems of transferring knowledge put focus on the system for knowledge sharing. We had previously focused on the IT-side of the systems, with an additional focus on knowledge mediators, certain important network enabling people in an organization. Now we dedicated an entire dimension to the routines, mediators and technical enablers for complete knowledge transfer.

4.3.7 The Final Knowledge Situation Model

We had now reached a final model with five dimensions that we believe are the most important to knowledge sharing (see Figure 6).

![Figure 6 The Knowledge Situation Model](image-url)
The dimensions were all linked tightly to each other and they all contained important aspects of inter-organizational knowledge sharing. The model is described in detail in chapter 7 (“The Knowledge Situation Model”) and the chapters 8 (“The Knowledge Dimension”) through 12 (“The Systems Dimension”). Furthermore, we tested it when analyzing two cases using the model. The analysis as well as the results from the analysis are presented in chapters 14 and 15, “Case one” and “Case two”.

4.3.8 The Cycle of Knowledge Sharing

During this time, studies had convinced us that the process of knowledge sharing was more an iterative cycle of activities than one pre-specified process. The cycle also included the evaluation/need, focus, analysis, planning and action activities, but the ad hoc manner and complexity of the task, together with recommendations of written sources, convinced us that knowledge sharing would take the form of a never ending iterative cycle with continuous evaluation and new focus.

The activities or phases of the cycle would all concern the different dimensions of the Knowledge Situation Model, which led us to say that it revolves around the model.

![Figure 7 The Cycle of Knowledge Sharing](image)

The cycle is defined and specified in detail in the chapter “The Cycle of Knowledge Sharing”, and then tested in the chapter “Case one”.

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4.4 Criticism of choice of method, approach and sources

In the paragraphs below the weaknesses of the method that we used is examined. Since the Knowledge Situation Model is based mainly on theoretical studies the main potential weakness is the written sources that was used.

4.4.1 Criticism of choice of method

One of the problems when dealing with a new topic is the problem of finding relevant data (Lekvall & Wahlbin, 1993). Knowledge sharing over company borders is a new topic. This limited the range of possible research methods for this study.

When dealing with the complex subject of outlining the relevant dimensions of inter-organizational knowledge sharing, an alternative approach could have been a multi-case study. Such a study would have included observations at a number of case companies. We believed, however, that it would have been hard to find a suitable number of cases with “best practices” in the field within a geographic range adjusted to fit the limited amount of time. We therefore concluded that a study of secondary data would give the result we desired.

4.4.2 Criticism of sources of data

The majority of our sources are American. There is a clear cultural difference between North America and Scandinavia. For instance people’s attitudes towards authority and their degree of individualism are different (Hofstede 1980; Trompenaars, 1994). This could affect the applicability of the model. We asked ourselves; would therefore more international sources, which take in account the effect of differing national cultures, have been preferable in order to limit the risk of cultural differences?

On the other hand, our European sources and the opinions of these authors do not differ remarkably from those of their American colleges. Their approach can be somewhat different, but we believe that is mainly due to the fact that American researchers generally have come further in their work. This taken into account, we don’t think that the more European sources would have been preferable.
5 Introduction to knowledge management

In this chapter we will introduce the term knowledge management, whose more intricate aspects we later will spend the rest of the thesis to examine. We start by composing a working definition of knowledge. Then we continue by defining knowledge management and show with examples what knowledge management is in practice.

5.1 Defining knowledge

Knowledge, information and data are three more or less abstract words, whose definitions are not evident. Therefore we would like to establish a working definition of knowledge for this thesis. The working definition will serve the purpose of explaining to the reader how we treat the term and what we mean when we use the word. Although many fail to see the point in defining knowledge, we will, for the purpose of understanding, provide the reader with some background on the subject. (Stewart, 1997)

Knowledge is neither data nor information, but it is related to both. (Davenport & Prusak, 1998) That is why we start with describing data and information, and then continue with relating knowledge to information and data.

We would like to add that we are of the opinion that too much emphasis should not be put on academic definitions. Knowledge management is about using real knowledge to create value in organizations. Therefore it is essential to us that the definitions we use have a value for the knowledge management practitioners that we hope will be reading this thesis.

5.1.1 Data & information

Data are observations of states of the world, for example, there are 617 units in the warehouse or 12 CL in the bottle (Davenport, 1996; Stewart, 1997). The observing of such facts can be done by people, but also by appropriate technology (Davenport, 1997).

Information can be described as data in a context, with relevance or a purpose (Drucker, 1988; Stewart, 1997). It is people who turn data into information. Unlike data, information requires that the person receiving the information makes an interpretation of it. No matter how simple information, price, revenue etc., the recipient has to agree on the interpretation of it to be able to reach the same conclusions about the information. (Davenport & Prusak 1998, Langefors 1993)
5.1.2 Knowledge

Knowledge is information that somebody has given a context, a meaning or a particular interpretation (Davenport, 1997; Stewart, 1997). Knowledge is a fluid mix of experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of those who know. In organizations, it often becomes embedded not only in repositories but also in organizational routines, processes, practices and norms. (Davenport & Prusak, 1998; Nonaka & Takeuchi, 1995)

Knowledge - a conclusion drawn from data and information.  
(Stewart, 1997)

From here we go on with defining our own working definition of knowledge. The purpose of this working definition is to focus the attention on what we feel is very important in knowledge management, that is not to overvalue the capabilities of information technology.

Working definition of knowledge

We have used the following definition of knowledge throughout this thesis:

Knowledge can be seen as a product of intellectual work that resides only in peoples’ minds. Knowledge is never transferred, information is transferred and knowledge is in the mind of the recipient derived from the received information.

This means that knowledge never can be stored except in people’s minds and that locating knowledge is always the same as locating people.
By using this working definition, we would like to emphasize the importance of people in knowledge management. The definition underlines that the individual’s process of transforming the information to knowledge is important and that it has to be paid attention to.

Both Nonaka & Takeuchi and Davenport & Prusak are of the same opinion concerning the creation of knowledge. Nonaka & Takeuchi are a little less restrictive than our working definition when it comes to how knowledge can be stored, they believe that some knowledge can be stored outside people’s minds. (Nonaka & Takeuchi, 1995; Davenport & Prusak, 1998)

The working definition that we have chosen is composed to be used in the context of knowledge transfer. Its main disadvantage is that it implicitly excludes collective knowledge, knowledge that resides not with one person but with a group of people. That is the view of knowledge that is often preferred among the researchers in the field of “learning organizations” and also by researchers with a more cognitive view of knowledge. We appreciate the advantages of other views of knowledge, but we also believe that in a strict “transfer-“view of knowledge, the definition that we have chosen is the most appropriate.

After reading the working definition, the reader might ask himself; what about all the knowledge management information systems that companies are constructing? What is stored in those if knowledge can not be stored?
We mean that the answer to that question is that they contain a description of knowledge, not the actual knowledge. The knowledge is described using information, or codified (see chapter “The systems dimension”), and it is the description of the knowledge that is stored, not the actual knowledge. Then, when someone reads this description of the knowledge, that person recreates knowledge in his own mind. The recreated knowledge is hopefully similar to the original knowledge, but it is very important to keep in mind that it is dependent on the interpreting person's frames of reference and experiences. The very point with our working definition is to put the focus on the intricate process of describing knowledge and then recreating it in another person's mind.

Some knowledge is possible to describe with information (codify), store or transfer, and then recreate, while other knowledge is impossible to describe. Whether it is possible to store or not depends on the type of knowledge (Nonaka and Takeuchi, 1995). We will further investigate different types of knowledge later in chapter “The knowledge dimension”.

### 5.2 Knowledge management

As knowledge becomes more and more important for organizations, there has developed a need to manage it, as any other asset (Day et al, 1998; Wiig et al, 1997; Wikström et al, 1994; etc). The activity of managing knowledge is called knowledge management. If successfully managed, knowledge can provide extraordinary savings and increasing returns. But returns of knowledge management are uncertain and knowledge has a tendency towards fragmentation and leakage, and therefore it also has a never-ending need for refreshment. (Day et al, 1998; Davenport & Prusak, 1998; Stewart, 1997)

There are almost as many views on what knowledge management is as there are practitioners and researchers working in the field. Knowledge management has come to be used to describe everything from organizational learning efforts to database management tools (Ruggles, 1998). Many have tried to define the term knowledge management but, since it is a novel discipline, it is still unclear what it actually includes. The problem with a definition is also that, once there is a definition, there are still many ways of interpreting it. Despite this we will, to explain what we mean, look at some of the definitions and from those derive our own definition of the term. This is done to provide an overview of how others think about knowledge management. The purpose is also that, by defining the term, we stress what we feel are the most important aspects of knowledge management. Here is a sample of how others have defined knowledge management:
Knowledge management is a systematic attempt to create, gather, distribute and use knowledge. (Davenport, 1997)

This definition focuses the attention on the systematic approach that has to be part of knowledge management. Managers of all times have been dealing with what their employees know, that does not mean that they are practicing knowledge management. It is when they start thinking in terms of managing their knowledge assets and approach this task in a structured way that they can call themselves knowledge management practitioners.

The ability to capture and leverage what employees know in order to exploit new markets and create innovative new products or services. (Neef, 1997)

What is interesting with this definition is that it is marketing-oriented. In stating “in order to exploit new markets and create innovative new products or services”, more focus is put on the marketing purpose of knowledge management. This might however be a too narrow definition, since it implicitly excludes everything but the two areas mentioned. It should also be noted that this definition does not mention knowledge creation.

It [knowledge management] is an approach to adding or creating value by more actively leveraging the know-how, experience, and judgement resident within and, in many cases, outside of an organization. (Ruggles, 1998)

This definition puts the focus on what knowledge management is about, adding or creating value, and on the leveraging of knowledge. It also details what should be leveraged, know-how, experience, and judgements. Interestingly, it also says that knowledge can be found outside of an organization, e.g. with a customer.

Our definition of knowledge management

This is our definition of knowledge management:

Knowledge management is an approach to create value by more actively creating, securing and leveraging the knowledge - know-how, experience, and judgement - resident within and, in many cases, outside of an organization. (Adaptation from Ruggles, 1998)
The skeptics

Then there are also those that are a little more skeptical about the whole idea of managing knowledge.

“The knowledge scam, the bastard child of logic, the last bastion against the economic mercenary, is error compounded on error.”

(Angell, 1998)

This quote points out that the benefits of knowledge management is not yet agreed on by all in the business community. There is still a great deal of skepticism, which is not strange after many early trial and error attempts. The skepticism also comes from early adopters’ overoptimistic about “knowledge management” technologies and their ability to solve the problem. Then there are the numerous technology vendors selling so called “knowledge management” tools, unable to deliver what they promised that also have contributed to this skepticism.

5.2.1 Knowledge management in practice

Definitions are interesting, but even more so is what actually is done. What do the activities of creating, securing and leveraging knowledge really mean? What do Chief Knowledge Officers and Knowledge Managers really do?

Several authors have tried to categorize the different knowledge management initiatives that companies have undertaken. Rudy Ruggles has categorized them, in securing, leveraging and generating of knowledge, a categorization that we like in particular as it uses the plausible purposes of knowledge management projects to categorize them. The three different purposes of knowledge management are in the following paragraphs briefly described. (Ruggles, 1998)

Securing knowledge

Securing knowledge is about securing the knowledge at present available in the organization, so that it does not disappear. For example capturing the knowledge of key people to minimize the damage to the organization if they leave. This could also include classifying and documenting knowledge. (Spek & Spijkervet, 1997)

Leveraging knowledge

Leveraging knowledge is about placing knowledge where most value can come of it. Central here is the transfer of knowledge (see chapter “The systems dimension”). Leveraging is about ensuring a targeted distribution of knowledge to other departments, geographical locations and new employees. Leveraging is to
make the location of knowledge optimal in the context of business processes, to make use of the knowledge in the best location and to make the knowledge available at the times when it is most needed. (Spek & Spijkervet, 1997)

**Knowledge creation**

There are several ways of creating new knowledge in an organization. Knowledge can be bought into a company by acquiring another company or hiring new staff. It can also be rented, i.e. temporarily hired, by e.g. hiring a consultant or granting money to a university for research. Using dedicated resources means generating the knowledge in the company’s own research department where the company’s own resources are dedicated only to knowledge creation. The probably most common way to, intentionally or accidentally, create new knowledge is by creating a knowledge fusion. It is about bringing people together, maybe from different backgrounds or departments, in order to mix their experiences and thus create new knowledge. (Davenport & Prusak, 1998; Nonaka & Takeuchi, 1995) Knowledge creation is in short to ensure the effective and efficient development of new knowledge and the improvement of old knowledge. (Spek & Spijkervet, 1997)

5.2.2 Knowledge management in strategies

There is also the strategic approach to knowledge management. Authors claim that knowledge is a decisive factor for the competitiveness of a company (Day et al, 1998; Earl & Scott, 1998). Therefore the aspect of knowledge should also be addressed in the company strategy. Spek & Spijkervet also underline the importance of formulating a strategic policy for the development and application of knowledge. At this level, knowledge management is very closely related to the theories about that which is usually called “core competence”. (Spek & Spijkervet, 1997)

5.2.3 People vs. technology

When it comes to knowledge management, the most important factor is not technology, but people (Davenport, 1997; Ruggles, 1998; Wallström, 1998). Knowledge resides in people’s minds, it has to be transferred between people and it is people who have to be motivated to share their knowledge and to accept others’ knowledge. One problem is the fact that IT vendors use the term knowledge management as a sales pitch for their "knowledge management tools". This contributes to a distorted picture of knowledge management and the belief that information technology is the solution.
Many things can not be stored on computers because computers quite simply cannot store too complex patterns effectively. Computers require a logical structure, like a text or a mathematical formula, a problem is that the world is illogical by nature. Friedrich Nietzsche once said “the world is logical only because we made it logical”. As it comes to more complex knowledge, there are fewer and fewer logical patterns and structures.

On the other hand when a structure exists, the computers are unbeatable. The more structure the better for the computer. That is why computers are superb for automating the handling and processing of data and information. Technology enables new knowledge behaviors. (Davenport & Prusak, 1998; Angell, 1998)

Knowledge management has in its early days been technology oriented. The technology orientation is due to the fact that most managers know more about the technology part than the human parts of knowledge management. Most managers faced with new challenges tend to approach them with familiar tools. This is a natural development and should probably be considered to be part of the development of a novel discipline. As knowledge management practitioners encounter the people related problems that are eventually bound to appear, there will probably occur a shift of focus. If the people related issues never appear, if technology can provide the whole solution, then it was not a knowledge project but merely another information system. (Ruggles, 1998)

Some researchers in information management would disagree, as they are of the opinion that people is a big part of information systems too. The difference then, compared to knowledge management, would be that in knowledge management the people play an even bigger relative part.
6 Knowledge and intangible values

In this chapter, we treat the issue of the value of knowledge management, intellectual capital, why measuring knowledge management is important and how to know when to engage in a knowledge management initiative with a customer.

The aim of knowledge management, as for any business activity, is to create value for the company. Using knowledge to create value has in many cases proven to be successful. But there is a problem to determine what value that has, or will, come out of knowledge management. According to a study by Michael Porter investments are also more likely to be dedicated to assets whose returns are less difficult to measure (Stewart, 1997). Therefore we have dedicated this chapter to the value of knowledge and how to measure it. We start by building up a framework for how to approach the issue and then continue with the value from knowledge management with customers.

6.1 Intellectual capital

What is described and accounted for in companies’ balance sheets are tangible values, it is those values that can be measured using classical accounting, i.e. stock holdings, machinery and equipment, etc. These tangible values are all directly connected to a company’s financial capital. (Drake, 1997; Wurzburg, 1997)

But then there are the intangible values, values in the form of customer relations, bright employees, a well functioning organization or an R&D department that is outstanding in producing new innovations. These are all values that are not accounted for in the balance sheets. Does that mean that they are not worth anything? We do not think so and neither do the shareholders of Nokia or Microsoft. (Stewart, 1997)

Thus one of the greatest challenges facing an incorporated company, when it comes to measuring its value, is the growing gap between the balance sheet value and the market value. That gap, that classic accounting fails to measure, is the intangible values or the intellectual capital of the company. The philosophy with intellectual capital is about looking into the hidden assets, tangible and intangible, of the company and find ways to structure and explain the value gap.

Rich Karlgaard of Forbes Magazine said in 1993; “as an index, book value is as dead as a doornail and an artifact of the industrial age. Human resources and intellectual capital are now the company’s most valuable assets” (Edvinsson &
Malone, 1997). Steven M H Wallman defines intellectual capital in a way that we like because of its simplicity (Mavrinac, 1997):

*All assets currently valued at zero on the spreadsheet.*

Intellectual capital is a new expression and also a fairly novel phenomenon in management literature. No standard has developed and the attempts to structure and describe it differ as does the significance people put in it. Although recently, in for example Norway, companies has shown interest in standardizing measures for intellectual capital (Wurzburg, 1997).

As of today, the most frequently quoted model for what intellectual capital is, and what it consists of, is the model used by the Swedish insurance company Skandia AFS. The Skandia model divides intellectual capital into *human capital* and *structural capital*, see Figure 9 (Edvinsson & Malone, 1997).

![Figure 9 Skandia market value scheme](Drake, 1997)

**Human capital** is the capabilities of the individuals required to provide solutions to customers (Stewart, 1997). It is the combined knowledge, skills and the ability to innovate of the employees in a company. A paradox is that although we talk of human capital, a company can not own its employees. Employees are human capital but they can leave anytime they want. (Edvinsson & Malone, 1997)

**Structural capital** is the hardware, software, databases, organizational structure, patents, trademarks and everything else that is left in the office when the employees have gone home and which supports the employees productivity. Structural capital includes *Customer capital* – the value of relationships with
customers – and organizational capital – the capital built into processes and innovation, or all of a company’s structural capital except for the customer capital (Drake, 1997).

The main obstacles facing the usage of intellectual capital and intangible assets in accounting is the difficulty to measure them and also, if they are measured, the even larger obstacle to value them in terms of money. That is why most people resist putting intangible assets on the balance sheets together with the tangible assets. On the other hand many have also realized the need to complement traditional measures with new measures intended for the estimate of intangible assets. (Wurzburg, 1997)

6.2 The value of knowledge management

The question of what values that can come out of knowledge management has been debated since the term was first heard. Therefore we will first in this section discuss what values, for the different stakeholders, that can come out of inter-organizational knowledge management between customers and suppliers. Later we will also address the issue of how to measure those values.

6.2.1 Value for the supplier

The cost for acquiring knowledge from the customer must out of a supplier’s perspective be weighed against the potential return from that knowledge (Cole, 1996). The value has to be compared to the cost of the particular offer (Kotler, 1997), which we also believe is not just valid for the supplier, but also for the customer. Managers must keep in mind that there are problems not big enough to address and that simply are not worth the cost of trying as all knowledge is not useful, nor possible to share or transfer (Davenport & Prusak, 1998).

When examining costs related to knowledge, it is important to look at all costs, not only the costs to implement knowledge management, but also the costs of maintaining it (Novins & Armstrong). There should also be a practical way to measure the value created by the initiative (Davenport & Prusak, 1998; Novins & Armstrong; etc.). See section 6.3 for a more detailed discussion.

Knowledge management with which customer?

Is it really worth the effort to start a joint program with the customer? It is very important not to take for granted that knowing more about the customer is always better, which would be the case if knowledge was for free. It is not.
Far from all customers are suitable to practice knowledge management with (Stewart, 1997; Peppers & Rogers 1993). In order to determine to what extent it is necessary to know the customer the following five criteria can be used (Cole, 1996; c.f. Rehme, 1998 and chapter “The customer relation dimension”):

**Level of customer involvement:** Does the supplier’s product play an important role in the customer’s life?

**Need for support and/or information:** Is there a need or opportunity for substantial interaction with the customer across the product life cycle (pre-sale, usage and service/support)?

**Distance from the customer:** Does an existing customer connection provide a cost-effective opportunity to build a knowledge base?

**Scope of opportunity and economics:** Is there an opportunity to expand the value of the customer connection through add-ons, cross-selling or up-selling\(^6\)? Would the contribution associated with the goods and services support the cost of building a customer knowledge base?

If most of these criteria are met, then the potential returns for the supplier is probably high enough for it to be a good idea to spend money on an improved relation through knowledge management (Cole, 1997).

**Applicability: To whom and where is knowledge valuable?**

In the complex marketplace of today, all stakeholders work together and each and everyone have a specific view of value. This leads to that everyone in the value chain has different priorities and focus, and therefore also different needs for knowledge (Kotler, 1997; Stewart, 1997). All knowledge is not valuable to all people, or as Thomas Stewart puts it (Stewart, 1997):

*One man’s knowledge is another man’s data*

We have chosen to refer to this as the applicability of the knowledge. We call knowledge that is local in nature and applies only to an immediate set of conditions and therefore valuable only in a single situation for *specific*. On the other hand, knowledge that is more generally applicable, across processes,

\(^6\) To use an existing customer relation for maximum exposure of other products for sale, and thus sell new products to existing customers.
industries and cultures, and therefore valuable in a number of situations, we refer to as general. (Cf. Novins & Armstrong, and Jensen & Meckling\(^7\), 1995)

**Specific value for the supplier**

There is an abundance of literature about how to value a customer relationship, also in monetary terms, and we will not recapitulate it here. Here we will only explain the term specific value and leave the rest for the reader to explore himself.

In the context of knowledge management with customers, *specific value* is value from knowledge that is only applicable on one particular customer. Specific knowledge can be knowledge about key people at a customer, a customer’s organization or his technical equipment, which is all knowledge that is only valuable for people that work with that specific customer.

We believe that all costs that are related to acquiring specific knowledge about a customer must be compensated by profits from sales to that specific customer. Specific values from knowledge can be for example better understanding of the specific customer’s needs and preferences, which leads to a more satisfied customer.

**General value for the supplier**

*General* value in the context of knowledge management with customers is value from knowledge that is applicable on more than one specific customer. General knowledge can be knowledge about an industry, a technology, the suppliers own products or general customer preferences, all which is knowledge that is valuable for more people than those who work with the specific customer from which it was retrieved.

We believe that depending on the degree of applicability of the knowledge the cost for retrieval must be compensated on the corresponding level. If the knowledge for example is applicable on an industry, the profits from the customers in that industry must compensate the costs related to the retrieval of that knowledge.

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\(^7\) Jensen & Meckling have a completely different definition of specific and general knowledge
6.2.2 Value for the customer

As well as the supplier asks himself if he wants to exchange knowledge with the customer, we believe that the customer also should ask himself; Is it really worth the effort to exchange knowledge with that supplier?

When a customer decides to exchange knowledge with a supplier, it is not a decision without consequence. In doing this, the customer is building a closer relation with the supplier, a relation that will make it more difficult for the supplier’s competition, and therefore the customer will become more dependent on him. This means that the customer has to choose the suppliers that he wants to share knowledge with carefully. (Stewart, 1997; Kotler, 1997)

One model we believe can be used for judging a supplier’s appropriateness for sharing knowledge with is the one presented by Peter Kraljic in 1983. It is a model for the development of supply management strategies toward suppliers. In short he concludes that if the supplier is a strategic supplier the correct strategy should be “to develop a long-term supplier relationship”. (Kraljic, 1983)

According to Kraljic the supplier is a strategic supplier if he acts on a complex market and if his products or services on the same time have a high importance of purchasing. A market is complex if there are few suppliers, high demand, few substitute products, high rate of technical development and high barriers of entry. The importance of purchasing for the supplier’s products is high if the purchasing volume is high and if the cost for the vendor's product constitutes a high share of the final product's cost. It is also the case if the delivered products affect the functionality of the final products to a high degree, or if the delivery time is long. (Kraljic, 1983)

If the supplier is strategic, it is the right strategy for the customer to build a long-term relation with the supplier (Kraljic, 1983). This relation could even comprise sharing knowledge in a common knowledge management initiative with the supplier.

6.3 Measuring the value of knowledge management

Until recently, most companies rely on financial measurements and results for measuring value and for managing and monitoring the business. The measures have been sales, return on investment, product margins, cash-flow etc. The disadvantage with measuring the company with these classical measures out of only one perspective, the financial, is the risk of shortsighted thinking and of sub-optimization (Kaplan & Norton, 1992).
The classical instruments do not take into account intangible values such as competence, power of innovation or satisfaction of customers. Therefore we believe that they are not appropriate as the only measures to evaluate knowledge management activities. The problem with intangible values is their very intangible nature, that they are hard to measure and even harder to quantify.

Since the probably biggest obstacle for measuring intangible values is to have them quantified, we believe they should not always have to be quantified, it is in the quantification that the biggest uncertainties are created. Hence, both quantitative and qualitative measurements are needed to evaluate the effects of managing knowledge (Davenport & Prusak, 1998). (Wurzburg, 1997)

This is of course not specific for knowledge management, but measuring the intangible values of knowledge management is for two reasons probably more important than for other activities in a company.

First, simply because most values that come from knowledge management are intangibles, like better decisions, more knowledgeable employees and more pleased customers. This makes them hard to detect and therefore it is even more important to find out if they really exist. Second, as stated before knowledge management is a novel discipline whose benefits are still doubted. Executives are also inhibited about making knowledge investments due to uncertainty about the value of the proposed investment (Drake, 1997).

Therefore we believe it is important to be able to show how investments in knowledge has been valuable, that is if they have been.

To show that the investment has been valuable, there must be a comparison between the costs and the benefits. Combining qualitative, quantitative, tangible and intangible measures and do a combined estimation of the complete picture is one way of achieving this. Like a stock market analyst takes into account not only financial measures, but also the company’s market reputation, his trust for the CEO etc., we believe that the problem with this way of judging an investment is that it tends to be subjective. This also has to be taken in account when calculating the risks.

Therefore we also believe that all factors that can be quantified, also should be quantified, not beyond reason, but to the extent where it still is credible. This is one way of removing parts of the subjectivity in the judgement. The process of quantifying the measures can on the other hand build in new subjectivity in the measures. That subjectivity has to be weighted against the subjectivity when using the qualitative measurements. This we believe should be done to minimize the
combined risk factor due to subjectivity in the quantified measures and the judgement of qualitative measures.

There are many ways of measuring the value of knowledge management and they all have to be applied with caution. If the wrong measures are applied, the results can be the opposite of what was intended and the measurements can in the worst case point in the completely wrong direction. Bad measures can point out the wrong way of doing things as best practice and similarly discriminate a new innovative way of doing things, which good measures would judge successful. This can be disastrous for the organization as the innovators are discouraged and their ideas are discredited. (Kleiner & Roth, 1997)

There is also a risk that people who are measured and evaluated feel discomfort that inhibits their work. They may even just start trying to live up to the measures instead of doing what is best for the business. (Kleiner & Roth, 1997)

To avoid using foul measures, companies should always remember that all improvements must always, sooner or later, show up in the real business performance, among the tangible assets. As long as the tangible measures at least are trusted the most in the long run, then there should be no problem.

6.4 Summary of knowledge and intangible values

The intellectual capital of a company is the gap between the balance sheet value and the market value. Intellectual capital is human capital, the employees, and structural capital, everything left in the office when the employees have gone home. Structural capital includes customer capital and organizational capital.

The cost for engaging in a knowledge management initiative with a supplier or a customer must be weighted against the potential return from the cooperation. The applicability of knowledge is about to whom and where knowledge is valuable. Knowledge applicable on a specific unit provides specific value for that unit. General value in this context is value from knowledge that is applicable on more than one specific customer. We believe that all costs that are related to acquiring specific knowledge about a customer must be compensated by profits from sales to that specific customer.

The disadvantage with measuring a company with only classical financial measures is the risk of shortsighted thinking and of sub-optimization. Balanced Scorecards have been developed as an alternative method to the classical measures.
Measuring the intangible values of knowledge management is for two reasons probably more important than for other activities in a company. First, because most values that come from knowledge management are intangible. Second, knowledge management is a novel discipline whose benefits are still doubted, and executives are inhibited about making knowledge investments due to uncertainty about the value.

Both quantitative and qualitative measurements are also needed to evaluate the effects of managing knowledge.
7 The Knowledge Situation Model

In this chapter we introduce the Knowledge Situation Model, the central model in our method to support knowledge sharing.

The Knowledge Situation Model is the fundamental model that is built in this thesis. The model contains five dimensions: knowledge, people, organization, customer relation and systems. How this model has been developed is described in the chapter “Method”.

![Knowledge Situation Model Diagram](image)

Figure 10 The Knowledge Situation Model

7.1 The intentions with the Knowledge Situation Model

This model has been developed with the purpose of providing a tool for the knowledge management practitioner that intends to increase the knowledge performance in a customer relation (cf. chapter “Thesis scope”). We have defined an organization's knowledge performance as how effectively and efficiently it creates value by utilizing its knowledge resources. The different dimensions in the model outline the most important components to stimulate knowledge sharing between organizations.

The remaining chapters of this thesis will all concern the content, intent, application of and conclusions from the Knowledge Situation Model.
8 The knowledge dimension

This chapter builds a theoretical framework for how to analyze the knowledge in an organization that intends to practice knowledge management. In this chapter, the most important attributes of organizational knowledge is outlined.

First of all, the knowledge management practitioner must be aware of that there is knowledge in organizations whose existence is known, and there is also knowledge which existence is not known as illustrated in Figure 11.

According to our view, this has implications for interviews and field studies looking for what knowledge people in an organization have and what they need. One implication on interview based field studies is as to what extent interviews can be relied on as being comprehensive descriptions of knowledge or knowledge needs. If people are asked what knowledge they possess or what knowledge they need, they will of course only answer with their aware knowledge and their aware lack of knowledge. The unaware lack of knowledge and the unaware knowledge can not be determined using interviews of people whose knowledge and knowledge needs are to be mapped.

![Figure 11 Knowledge awareness adaptation from Liam Fahey (Stewart, 1997)](image)

In the following paragraphs we will examine the availability of, the content of and how to categorize knowledge. Availability is about how easy it is to find and gain access to knowledge, content is about its quality, and categorization is about for whom the knowledge is useful and how easy it is to transfer it to others.
8.1 Knowledge availability and content

First knowledge has to be in the appropriate form, time and location. The wrong form means that knowledge is not present in its optimal form, for instance in a thick manual or only in one person. Time is when knowledge is only present between certain hours. The wrong location is when knowledge is not present where it is mostly needed in the organization or when it is fragmented so that no synergies occur. (Spek & Spijkervet, 1997)

![Knowledge Dimension Diagram]

Figure 12 The knowledge dimension (adaptation from Spek & Spijkervet, 1997; Novins & Armstrong)

The content is about knowledge quality. Bad knowledge can be at least as harmful as good knowledge can be valuable. Knowledge of good quality is up-to-date, uniform (everybody means the same thing with it) and possible to apply to the business. (Adaptation from Spek & Spijkervet, 1997)

Amidst all the talk about leveraging knowledge, it is easy to forget what is often taken for granted in all these discussions; the fact that the knowledge that is to be leveraged can do more harm than good if it is not of sufficient quality. Jack Welch, chairman of GE expresses it:

The only ideas that count are “A” ideas.

8.2 Knowledge categorization

Knowledge management practitioners tend to analyze knowledge in an organization in terms of what the knowledge is about rather in terms of its usability, i.e. applicability and transferability. We believe, together with Novins & Armstrong that this is wrong (Novins & Armstrong). We believe that it is impossible for a knowledge manager to tell everyone in the organization what kind
of knowledge his employees need. That is a question everyone is best suited to answer for himself and the knowledge managers’ efforts are better needed elsewhere, to help employees find the knowledge that they need.

Thus it is essential to have a framework for knowledge categorization, in order to distinguish the knowledge most favorable to transfer. This is the knowledge that is best suited to transfer and yields the highest returns in relation to the cost of transfer. (Novins & Armstrong; cf. chapter “Knowledge and intangible values”)

After a framework for the categorization of knowledge is established, we will for each type of knowledge, describe how to approach that type of knowledge in the context of knowledge management.

8.2.1 Applicability

The applicability category answers the question: How broadly does the knowledge apply? Specific knowledge applies only to a limited set of conditions. It is dependent on a physical and/or geographic situation, it can be called ”detailed” knowledge. (Adapted from Novins & Armstrong; Jensen & Meckling, 1995)

General knowledge on the other hand is applicable across the business. It crosses process, industry technical and cultural bounds. The more situations the knowledge is applicable in, the further towards the general extreme of the scale it ends up. (Adapted from Novins & Armstrong; Jensen & Meckling, 1995)

The nature of general knowledge makes it more valuable to transfer to other locations. Since general knowledge is applicable over a wider range of the organization, it is also useful to more people. (Adapted from Novins & Armstrong; Jensen & Meckling, 1995)

8.2.2 Knowledge transferability

Knowledge transferability is about how difficult it is to transfer the knowledge. The two extremes on the knowledge transferability scale are tacit and explicit. Transferability is about how much the knowledge is dependent on the context in which it is presented, how much meaning that would be lost if some or the entire context was removed. It is also about the cognitive dimension of the knowledge, the mental models\(^8\) beliefs and perceptions so ingrained that they are taken for

\(^8\) Mental models are internal pictures of the world that shape our decisions and actions (Senge, 1994)
Tacit knowledge is personal, context specific and therefore hard to formalize and communicate. It is strictly subjective, i.e. connected to the person and therefore harder to share. Tacit knowledge includes cognitive and technical elements or “mental models” such as schemata, paradigms, perspectives, beliefs and viewpoints, which help individuals define their world. The technical element of tacit knowledge includes know-how, crafts and skills. Knowledge of experience tends to be tacit, physical and subjective. (Novins & Armstrong; Nonaka & Takeuchi, 1995; cf. Jensen & Meckling, 1995)

Explicit knowledge, or “codified knowledge”, refers to knowledge which is transmittable in formal, systematic language. Explicit knowledge is often about past events and objects, “there and then”, and created by “digital activity”. At one extreme on the transferability scale, the line between the explicit knowledge and the tacit knowledge is very diffuse. But the line on the other extreme of the transferability scale is as diffuse. That is the line between explicit knowledge and information. (Novins & Armstrong; Nonaka & Takeuchi, 1995; cf. Jensen & Meckling, 1995)
After presenting a framework for categorizing knowledge, we will now outline the strategies for the different kinds of knowledge (Novins & Armstrong).

8.2.3 Broad-based knowledge

Broad-based knowledge is knowledge that is both easy to transfer and broadly applicable. Thus the right strategy is to package it and widely disperse it in the organization. It should be kept in mind though, that this kind of knowledge is often the cause for “information overload” (Novins & Armstrong). Therefore we believe that the pull technique (in contrast to push) is often to prefer for information dissemination.

8.2.4 Complex knowledge

Complex knowledge is knowledge that is widely applicable but also hard to transfer. This kind of knowledge needs a richer medium to be transferred, see chapter “The systems dimension”. The preferred medium is often formal training or apprenticeship. (Novins & Armstrong)

8.2.5 Quick access knowledge

This knowledge is easy to transfer but not very broadly applicable. It is best managed by placing it in an accessible spot, like a searchable database, so that people can access it when the need arises. We believe that this knowledge should not be distributed using a “push” technique, which would create a big risk of causing information overload, with information that for most is of little value. (Novins & Armstrong)
8.2.6 One-off knowledge

One-off knowledge is knowledge that is neither easy to transfer nor broadly applicable. Because the benefit of managing this category of knowledge is low, it makes little sense to practice knowledge management with it. Therefore it is sufficient in this area to use more informal low-cost methods, like supporting the establishment of informal networks between professionals. (Novins & Armstrong)

8.3 Summary of the knowledge dimension

The availability, content and categorization of knowledge have great impact on knowledge sharing.

The availability is about where the knowledge resides, in what form time and location it is to be found, and the knowledge categorization is about its applicability and transferability, i.e. for whom it is valuable and how easy it is to transfer. Knowledge content is about quality. Bad knowledge can be at least as harmful as good knowledge can be valuable.

The applicability is about for whom it is useful and is closely linked to the value of the knowledge. The transferability of the knowledge, ranging from tacit to explicit knowledge, determines how easy it is to transfer. From the applicability and transferability of a specific type of knowledge it is possible to draw conclusions about with which strategy to approach the management of that particular knowledge.
9 The people dimension

In this chapter, the impact of the culture and people’s frames of reference on knowledge management is treated.

A man has no ears for that to which experience has given him no access.

Friedrich Nietzsche

We are of the opinion that knowledge management is essentially about people who possess knowledge and how to make them share what is in their minds. Because people are so central to knowledge management, we have dedicated an entire chapter to the people-related issues. This chapter is divided into culture and frames of reference as is “The people dimension” of the Knowledge Situation Model (see Figure 15).

9.1 Organizational culture

An organizational culture is a set of values and beliefs shared by a group. It is a way to perceive, think and feel in relation to problems. A culture is acquired when a group solves problems and is therefore by the members of the group conceived as the correct way to approach problem solving. A culture is often taken for granted and people are rarely aware of how they are affected by it. Because a culture affects the very way people perceive reality, it becomes important for the
success of knowledge management. (Stewart, 1997; Wikström et al, 1994; Argyris & Schön, 1996)

Edgar Schein\(^9\) talks about a culture that works as a *perpetual [endless] learning system* (Argyris & Schön, 1996), which is the state we would like to achieve by practicing knowledge management. In the following paragraphs we will examine some of the attributes of an organizational culture that affect an organization's knowledge performance. First, and probably also most important, we treat the importance of a culture based on trust and understanding.

### 9.1.1 A culture of trust

A culture of trust means that people trust each other to exchange knowledge. It includes that people trust others also to be knowledgeable and in possession of knowledge that is valuable to them. People sharing their knowledge must also feel that it is worth the time they invest in sharing it. (Wiig et al, 1997; Stewart, 1997; Davenport & Prusak, 1998; Kim & Mauborgne, 1997)

The sharing of knowledge is a voluntary act. Therefore there has to be incentives, trust and no potential negative consequences for sharing. (Davenport, 1997)

> **Without a culture of teamwork, compensations and rewards that supports it, a garden of knowledge will be as forlorn as a playground built next to a seniors-only condo.** (Stewart, 1997)

If people do not trust each other, attitudes like “it’s not my job,” “not invented here” or “knowledge is power” can cripple the knowledge management work. People with the “it’s not my job” attitude think that it is a waste of time to help others, they do not trust others to help them with the result that they think that they are better off just minding their own business.

The “not invented here” attitude means that there is a culture of distrusting everything not invented in the own organization. Everything has to be home made. Of course this causes the wheel to be invented over and over again in the organization, every time something is invented that someone else already has come up with. (Davenport & Prusak, 1998; Wiig et al, 1997; Stewart, 1997)

If having knowledge is associated with status and owning knowledge is rewarded, a “knowledge is power” attitude can be created as a result (cf. incentives in

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\(^9\) In his 1985 book organizational culture and leadership
chapter “The organization dimension”). That can lead to people or groups of people hoarding knowledge for personal gain or political reasons (Wiig et al, 1997; Davenport & Prusak, 1998). Therefore, information differences among employees should not become the source of authority or power. Instead the company should evaluate performance and provide incentives based on knowledge sharing. (Nonaka & Takeuchi, 1995; Davenport & Prusak, 1998)

Building a culture of trust is an important task for the leaders in the organization (Argyris & Schön, 1996; Kim & Mauborgne, 1997) (see further discussions in chapter “The organization dimension”). Trust can be built through the development of personal relationships, which in turn is built by letting people socialize. (Davenport & Prusak, 1998)

9.1.2 A culture of understanding

A culture of understanding means that people who are supposed to share knowledge understand the benefits of sharing knowledge and why they are supposed to take of their time to do that. Departments or individuals with useful knowledge are often not aware of the value of their knowledge for others (Brynjolfsson, 1993). Then it is very hard to motivate the extra work that is brought by having to share it with others. It is equally difficult to motivate people to accept other’s knowledge if the purpose is not understood. This is also related to the not invented here syndrome. (Davenport & Prusak, 1998; Wiig et al, 1997)

The cure to this disease is not as simple as it sounds. It is to make people understand why they are supposed to share knowledge, to make them understand the benefits of sharing and the consequences of not sharing (Davenport & Prusak, 1998). Making people understand is not easy and it can therefore take time and resources to develop an understanding for the benefits of knowledge sharing.

Ideally, official company goals and policies should be aligned with those of knowledge management (Wiig et al, 1997). It is also important that management shows the importance of knowledge sharing, both by encouraging it and by living as they teach.

9.1.3 A culture of altruism

Sharing knowledge sometimes demands giving away knowledge without receiving as much in return. A culture of altruism means that people in possession of the knowledge is, without expecting compensations, willing to share knowledge and information with his peers. The sharing process is highly dependent of altruism.
(Davenport & Prusak, 1998) We also believe that an understanding for the benefits of knowledge sharing supports and fosters altruism.

*Collaborate is to give and take – and in that order (Gary Hamel)*

### 9.2 Frames of reference

The process of communication is affected by the personal characteristics of people that are communicating (Moberg, 1993; Novins & Armstrong). For people to be able to communicate and understand each other it is important that they have compatible frames of reference, otherwise they will have difficulties sharing or transferring knowledge (Davenport & Prusak, 1998; cf. chapter “The systems dimension).

An individual’s frame of reference can affect what message he perceives from the communication. (Moberg, 1993)

#### 9.2.1 The ambiguity of knowledge

The ambiguity of knowledge is about how different people reading a text, depending on the circumstances, their past experiences and opinions might draw completely different conclusions. (Davenport 1997; Davenport & Prusak 1998; Stewart, 1997) The ambiguity of knowledge can be illustrated with the infological equation: $I=i(D,F,t)$ (adaptation from Langefors, 1993).

The infological equation illustrates how different factors affect how a person interprets knowledge that he is exposed to. According to the equation, the information (or knowledge) perceived depends on the interpretation (i) of the data, D (or information), the frames of reference, F, which the person already has. The interpretation is done during the time, t, that the recipient has to interpret the information. We believe that both the time during which the recipient has to do the actual interpretation, i.e. when he is exposed to the information, and the time during which he has to process the received knowledge after the exposure, affect the interpretation. The frames of reference consist of all the knowledge that the person already possesses, and also his values, beliefs and mental models$^{10}$. (Romme & Dillen, 1997; Moberg, 1993; adapted from Langefors 1993)

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$^{10}$ Mental models are internal pictures of the world that shape our decisions and actions (Senge, 1994)
If organizations have different cultures or vocabularies, or people in them have different frames of reference, a common ground can be created through face-to-face discussions, education, teaming and job-rotation. (Davenport & Prusak, 1998)

9.3 Summary of the people dimension

Trust and understanding are the most important components of a knowledge sharing culture. Understanding is important to make people realize the benefits of knowledge sharing and trust is important in order to make people share knowledge and use other people’s knowledge. Understanding is built through information about the benefits of knowledge sharing, and trust is built through the development of personal relationships, which is best built by face-to-face meetings.

For people to be able to communicate and understand they must have compatible frames of reference, else they will have difficulties sharing or transferring knowledge. This can be achieved in socialization through face-to-face meetings, education, teaming and job-rotation.
10 The organization dimension

In this chapter we outline the attributes of an organization that we find relevant for the knowledge management practitioner; the organizational structure, the leadership and the incentives.

Organization is a word with many different, and often subtle and complex, meanings for different people. We have focused on organizational structure, leadership and incentive structures as we have found that they are the attributes of an organization that is the most important for knowledge management. Incentives are often seen as a part of the organizational structure, but in the context of knowledge management, we are of the opinion that incentives are important enough to be treated separately.

Figure 16 The organization dimension

10.1 Organizational structure

Organizational structure can be defined as the sum total of the ways in which its labor is divided into different tasks and how coordination is achieved among these tasks (Mintzberg, 1983).

A lot has happened since Max Weber in the late nineteenth century presented his study about the bureaucracy. He then concluded that bureaucracy, as regards the precision, constancy, stringency and reliability, was the superior form of administrative organization. That was true then, but things have changed since. (Pinchot & Pinchot, 1993)
As knowledge and innovation become more central to competitive success, it should come as no surprise that there has been a growing dissatisfaction with traditional organizational structures, like the bureaucracy (Nonaka & Takeuchi, 1995).

10.1.1 Bureaucracy and task force

For most of this century, organizational structure has oscillated between two basic types of structure: 

- **bureaucracy** and **task force**. Bureaucratic structure is highly formalized, specialized and highly dependent on the standardization of work processes. Bureaucracy works well when conditions are stable, since it emphasizes control and predictability of certain functions. Bureaucracy can generate other dysfunctional characteristics, such as inter-organizational resistance, red tape\(^{11}\), tension, neglect of responsibility, means becoming objectives and sectionalism. The task force is the bureaucracy’s opposite and brings together representatives of a number of functions. The task force is flexible, adaptable, dynamic and more participation-oriented and can therefore be more effective than bureaucracy in impelling motivation. (Nonaka & Takeuchi, 1995)

When it comes to knowledge sharing, Nonaka & Takeuchi claim that neither of these structures are adequate, and that a mixture is necessary to manage knowledge. The task force is good at motivating people and promote initiative. Bureaucracy, on the other hand, is good at performing repetitive tasks with precision, constancy and reliability. For every task that organizations are to perform they have to decide which mix of the two forms that is the appropriate. (Nonaka & Takeuchi, 1995)

10.1.2 Planning and control systems

Planning and control systems are a substantial part of the organizational structure. According to Mintzberg there are two distinctive kinds; one that focuses on regulation of overall performance and the other that seeks to regulate specific actions. (Mintzberg, 1983)

The first is after the act monitoring of results called *performance control*. The latter, oriented to specifying activities that will take place, is labeled *action planning*. *Performance control* imposes general performance standards over a

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\(^{11}\) Silly detailed unnecessary official rules that delay action (Longman’s Dictionary of Language and Culture, 1993)
period of time, with no reference to specific actions. *Action planning* imposes specific standards and actions to be carried out at a specific period of time.

For knowledge sharing, we believe that action plan can be a too rigid system, and that performance control often is the desired system to use, partly because people who do the work are in the best position to see how its details must be changed. (Wiig et al, 1997)

### 10.1.3 Knowledge and decision rights

An important characteristic of the organizational structure is the location of decision rights i.e. the level of decentralization. The one who makes a decision also has to have access to the right knowledge to make the best decision. Thus the collocation of knowledge and decision rights is one of the most important aspects of organizational design in relation to Knowledge Management. (Jensen & Meckling, 1995; Brynjolfsson, 1993)

![Figure 17 The optimal level of decentralization](image)

This model puts the focus on the importance of the collocation of the knowledge and the decision rights. It is intended to remind the knowledge management practitioner of that the knowledge can be moved to where the decision rights are located, but the decision rights can also be moved to where the knowledge is. (Jensen & Meckling, 1995)

According to Nonaka & Takeuchi, more responsibility for knowledge sharing should be put on the middle managers, which have an important role as interpreters and transferees of knowledge from top management and front-line workers. They believe that it often is the middle managers that have the best
knowledge about who in the organization that needs what knowledge. (Nonaka & Takeuchi, 1995)

10.1.4 Dedicated time

For knowledge management to be effective, organizations must realize that knowledge does not come for free. There must be some kind of dedicated resources, in the form of peoples’ time, for the activity of knowledge sharing. (Davenport & Prusak, 1998; Stewart, 1997)

The dedicated resources can be new breeds of professions, like knowledge managers or Chief Knowledge Officers. It can also be just a portion of a person’s time or a fixed timeframe once a week for a group to have a meeting.

10.2 Leadership

Success in knowledge management depends on leadership, and the primary task of leaders in contemporary organizations is to create and sustain a knowledge-oriented culture (see chapter “The people dimension”). The aim of the leadership is to make employees feel satisfied and positively reinforced and thus encourage them to perform their best. (Argyris & Schön, 1996; Stewart, 1997) Edgar Schein defines leadership as the attitude and motivation to examine and manage culture (Argyris & Schön, 1996).

Leadership in a knowledge management situation is not about giving orders, but about leading. Knowledge sharing is an activity that neither can be supervised nor be forced out of people, it happens only when people cooperate voluntarily. Getting that to happen might be one of the key managerial issues for the modern leader. (Kim & Mauborgne, 1997; Wiig et al, 1997; Pinchot & Pinchot, 1993)

We believe that the prevalent leadership style in organizations with high knowledge performance is probably less authoritative and more democratic. Managers in those organizations exercise less direct control and coordinate more using common goals and visions. Several authors talk about the knowledge oriented leader as a champion who promotes change (in culture) and help teams withstand outside distractions (Stewart, 1997; Wikström et al, 1994; Wiig et al, 1997).

10.2.1 Knowledge sharing obstacles resulting from bad management

Bad management can cripple an organization’s knowledge performance. This happens if the leadership is based on the beliefs that people provide their best
work under pressure, or that people should perform all work without wasting time getting to know each other. This removes the time and opportunities for people to get to know each other, i.e. build trust, and to help others by sharing knowledge. (Wiig et al, 1997; Davenport & Prusak, 1998)

A belief among managers that “managers and specialists know what has to be done, others don't need to bother”, is also very negative for the knowledge performance (Wiig et al, 1997). The same is true for a display of intolerance for mistakes or need for help from leaders (Davenport & Prusak, 1998).

10.2.2 Fair process

The psychology of fair process builds on trust (see chapter “The people dimension”) and commitment that produces voluntarily cooperation. People have to be motivated to perform their best in situations where they have to use their intellectual capacity. Since all activities that involve the handling of knowledge, e.g. knowledge sharing, also involve using people’s intellectual capacity, we believe this to be very important for knowledge management. A prerequisite for people to be motivated is that they feel they are treated fairly, that they are treated with a fair process. (Kim & Mauborgne, 1997)

Studies of legal systems have shown that people care as much about the fairness of the legal process through which the outcome is produced, as for the actual outcome. In their HBR article, Chan Kim & Renée Mauborgne describe what they call procedural justice and distributive justice. (Kim & Mauborgne, 1998)

Distributive justice is the traditional form of justice in business organizations that originates in the ideas of F. W. Taylor. It is built on allocating resources, creating economic incentives, monitoring and measuring performance and manipulating organizational structures to set lines of authority (Kim & Mauborgne, 1997). A manager describes it as; giving people the authority they deserve, the resources they need or the rewards they have earned (Kim & Mauborgne, 1997). This is in fact the managers’ subjective, and in some people’s view arbitrary, opinion of what they have deserved. (Kim & Mauborgne, 1997)

Procedural justice on the other hand differs from the traditional distributive justice by its focus on the process leading to the outcome. There are three guiding principles of the fair process. These are engagement, explanation and expectation clarity (Kim & Mauborgne, 1997).

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Engagement means involving individuals in the decision that affect them by asking for their input and allowing them to refute the merits of one and another’s ideas and assumptions. Explanation is achieved when everyone involved and affected understands why final decisions are made as they are. It is an explanation of the underlying factors of the decision that was taken. This allows employees to trust the manager’s intentions, even if their own ideas have been rejected. Expectation clarity requires that, once a decision has been made, managers state clearly the new rules of the game. Employees should know after what standards they will be judged and what they are expected to achieve. It matters less what the new rules are and more that they are understood. (Kim & Mauborgne, 1997)

10.2.3 Building a knowledge sharing culture

A knowledge sharing culture is one in which people trust each other, where people understand the benefits of knowledge sharing and people are willing to take from their own time to help others (see chapter “The people dimension”). (Davenport & Prusak, 1998; Wiig et al, 1997; Kim & Mauborgne, 1997)

Leaders in organizations with a high knowledge performance see to that people have time to talk to each other and that anybody can talk to anybody else (Wiig et al 1997, Davenport & Prusak 1998). They also create a teaming culture, which supports change of ideas and cross-functional execution of business initiatives (Wiig et al, 1997). Knowledge sharing should also be encouraged and rewarded (Davenport & Prusak, 1998), not necessarily with monetary rewards but maybe a recognition or just an unofficial tap on the shoulder.

To achieve this managers ought to accept and reward creative errors and collaboration, and there should be no loss of status from asking and thus showing that one does not know everything. Leaders should also encourage a non-hierarchical approach to knowledge and establish the fact that the quality of ideas is more important than the status of the source. (Davenport & Prusak, 1998)

10.3 Incentives structure

Organizations exist to motivate members by providing them with incentives (Day et al, 1998). Incentives can be seen as reasons for or motivation for doing something, e.g. share certain types of knowledge with others. Disincentives can be seen as reasons not to do something, e.g. not to share certain types of knowledge with another entity. (Davenport, 1997)

Sharing of knowledge is a voluntary act, therefore one of the most important activities of knowledge intensive organizations is to give reasons for people to
share knowledge; there must be incentives for sharing information and knowledge. Knowledge sharing must therefore be encouraged and rewarded. (Davenport & Prusak, 1998; Drake, 1997; Davenport, 1997)

The incentive structure is the sum of the incentives and the disincentives. The incentives must be stronger than the disincentives if an effect is to be obtained.

People are motivated differently and by different things and as incentives vary from person to person, it is important to realize that there exist a number of things that motivate, and fail to motivate employees. If the expected result is to be obtained then the right mix of incentives must be found for each situation.

We have chosen to divide incentives into leadership, monetary, status related and social incentives.

Leadership incentives are incentives that come from leaders who are supportive and encouraging of knowledge creation and sharing.

Monetary incentives are monetary rewards like gifts, bonuses or higher salary.

Status related incentives are e.g. honor, promotion, more responsibility or more important or interesting work.

Social incentives - are individuals’ desires to satisfy the group to which they belong and thus achieve a higher status in the same. Positive encouragement or feedback from the same group can enhance this.

To give concrete examples of knowledge management supporting incentives, we present below some examples used in relation with knowledge management.

10.3.1 Personnel evaluations and promotions to knowledge sharing personnel

To support knowledge sharing, organizations can use leadership incentives in the form of evaluation reports to recognize the importance of knowledge sharing. These leadership incentives can also be supplemented by monetary incentives in using e.g. performance evaluation criteria that recognizes personal learning, collaboration and knowledge sharing. A good example of a status-related incentive, is a price given to the “theft of the year” for someone that in an innovative manner has applied someone else’s knowledge to solve a business problem. (Wiig et al, 1997)
Funding is a strong monetary incentive. Funds can be directed to certain conferences and meeting attendance where people effectively share knowledge. Funding can likewise support education and training (Wiig et al., 1997). We think that it is important to outline that lack of funding or discontinued funding is analogously a monetary disincentive.

Role models are important for knowledge sharing. They constitute leadership incentives or social incentives to share knowledge. Role models can be disincentives as well, if they are bad role models. Therefore it is important that leaders live as they teach, that they “walk the talk”. Using role models could more precisely be the recruiting or promotion of individuals that demonstrate active knowledge sharing and thereby support the leveraging of collaborative behavior.

10.3.2 Awards to knowledge sharing R&D people

Specific incentives can be used to motivate knowledge sharing among R&D people. Incentives can be given as status related incentives like patent awards or positive performance reviews like a “theft of the year” award. Celebrations of, and rewards for successful knowledge sharing work as social, status related and leadership incentives. Monetary incentives like bonuses and other monetary rewards can also be used to reward knowledge sharing.

We would like to remind the reader that incentives should be simple and understandable for those on which they are supposed to have effect. We believe that if people do not understand the performance evaluations systems, then they do not know what they are supposed to do, with the result that the incentives completely loose their effect. Stewart puts it this way: “Too complex incentive structures can fail to give the desired effect. Elaborate systems of incentives and rewards for knowledge sharing are, if based on the wrong criteria of measurements, more likely to encourage the dissemination of trivia than the systematic enhancement of corporate brainpower.” (Stewart, 1997; cf. “expectation clarity” in “Organizational structure”)

We conclude that incentives, like leadership (and most other things too), must be adjusted to fit the situation in which they are supposed to be effective.

10.4 Summary of the organizational dimension

Modern organizational design is about weighing factors against each other. The advantage of the task force, which brings together representatives of a number of functions and impels motivation, must be weighted against the advantages of the bureaucracy, which is precise, constant, and reliable for repetitive tasks. Similarly
it is also about weighing the advantages of the action plan against those of the performance plan.

The location of decision rights is another important factor, he who makes a decision also has to have access to the right knowledge to make the best decision. Managers must see to this, either by relocating the decision rights or by moving the knowledge. For knowledge sharing to be effective, there must be dedicated resources in the form of people’s time.

Knowledge sharing is an activity that neither can be supervised, nor be forced out of people, it has to be voluntary. Therefore the role of the leadership is to create and sustain a knowledge-oriented culture. The most suitable leadership style to promote knowledge sharing is probably less authoritative and more democratic. Managers in those organizations exercise less direct control and coordinate more using common goals and visions.

For people to be motivated, they must feel they are treated fairly, that they are treated with a fair process. Managers ought to accept and reward creative errors and collaboration. To motivate the employees to share knowledge, management has to adopt the incentives to the situation. Leadership, monetary incentives, status-related incentives and social incentives can all be used to motivate knowledge sharing.
Sharing Knowledge over Company Borders

Tommy Andersson and Tom Westerlind
11 The customer relation dimension

This chapter aims at explaining the importance of different aspects of the customer relation when sharing knowledge with a customer.

"The best way to predict the future is to create it."

Peter Drucker

The information revolution is not primarily an IT revolution but a relationship revolution (Collins, et al, 1998). In today’s economy the simple supplier is dead. Companies seek competent suppliers who can solve problems quickly. Increasingly, they also demand that the supplier delivers a customized and coordinated set of business solutions. The modern supplier works closely with his most important customers to improve products and processes. This requires knowledge about the customers, knowledge that can only be obtained through close contact. The word for this is relation marketing. (Kotler, 1997)

Relation marketing is when a company has dedicated customer accounts to serve such large customers that it wants to win and/or provide better service for. The objective is to establish a long-term relationship with the customer to create a relation in which the supplier and the customer can grow together and thus create maximum value together. (Rackham, 1987; Kotler, 1997)
11.1 The network view and knowledge sharing

A customer relationship can be described as a number of bonds between the supplier and the customer. The bonds form a network based on mutual adaptations which tightens the inter-firm relationships. The network view divides these bonds into social bonds, legal bonds, logistical and administrative bonds, and technical and knowledge bonds. (Hammarkvist et al, 1982; Håkansson 1982; Johansson & Mattsson 1987)

Social bonds are personal relationships between the decision-makers in the participating firms, which are important for mutual trust. Legal bonds are about agreements and treaties, which tightens the partnership. Logistical and administrative bonds come from coordination, routines or geographical or structural adaptations. Technical bonds are e.g. adaptations in products and production resources and machinery or adaptations of technical resources. Knowledge bonds are bonds of knowledge developed from the relationship. (Hammarkvist et al, 1982; Håkansson 1982; Johansson & Mattsson 1987) These different bonds create interdependencies that strengthen the relationship. (Rehme, 1998) But what impact do these bonds have on knowledge sharing?

11.2 Incentives & simplicity

Bonds between a supplier and a customer both create an incentive to share knowledge through technical and knowledge or legal bonds, and simplify the knowledge sharing, through social or logistical and administrative bonds. An existing customer connection provides a cost-effective opportunity to build a knowledge base (Cole, 1996), with or about the customer, as well as it creates an incentives to do so.

11.2.1 Technical and knowledge bonds create incentives

Technical bonds are when the customer has made adaptations in products, production resources, machinery or of technical resources to fit the deliverer’s products or services. For instance if the customer has adapted his production to a deliverer’s products, he has an incentive to share knowledge about those products with his deliverer. To be able to run his business efficiently, the customer probably needs knowledge about the deliverer’s products that he has adapted to.

Knowledge bonds are by definition an incentive for knowledge sharing, since those bonds are when the deliverer possesses knowledge that the customer needs. One example of knowledge bonds is of course when the customer has installed the deliverer’s technology.
The logic of incentives and the *technical and knowledge bonds* is similar to that of Paul Cole’s five criteria for knowledge management with a customer to be interesting, see chapter “Knowledge and intangible values”. He claims that the supplier’s product should play an important role in the customer’s life for knowledge management to be of interest, which is exactly what *technical and knowledge bonds are about*. (Cole, 1996)

11.2.2 Legal bonds create incentives

Legal bonds can be a legal commitment or agreement to educate, i.e. deliver knowledge, or to take part of a partnership. An example is to deliver knowledge about bugs and defects in delivered products as quickly as the supplier has knowledge of them. Legal bonds create incentives to share knowledge, either by knowledge delivery being explicitly mentioned in a contract or by creating an indirect incentive through for example a partnership contract. If two organizations join in a partnership and are supposed to cooperate closely, then they have to know a lot about each other to cooperate efficiently (Stewart, 1997).

On the other hand it can be questioned if it is possible to write contracts on knowledge transfer, considering the fact that it is very hard to measure intangibles (see the chapter “Knowledge and intangible values”). Legal contracts usually just set a minimum level and everything above that level is not rewarded, which means that when the minimum level is reached, the legal incentive is gone. Altogether this often makes legal incentives less important in the exchange of knowledge between a supplier and a customer.

11.2.3 Social bonds simplify

Knowledge sharing, depend on people and that they interact with each other. It is important that the individuals have a trustful relation and that they have similar frames of references (see chapter “The people dimension”).

All this is built with social contacts, when people meet and get to know each other (Rehme, 1998; Davenport & Prusak, 1998). Social bonds are when people at the customer and the deliverer have personal relations. Hence, social bonds between a supplier and a customer make it simpler to start sharing knowledge.

11.2.4 Logistical and administrative bonds simplify

*Logistical and administrative bonds* are for example adapted administrative routines, adapted delivery processes or geographical proximity. All these are bonds that simplify the sharing of knowledge. Geographical proximity makes it
easier for people to meet, administrative routines can even be used as systems for knowledge transfer (see chapter “The systems dimension”).

11.3 Knowledge sharing requires a close relationship and vice versa

Stewart outlines different levels of a customer relationship, or intra-organizational bonding, and connects these levels with their respective needs for knowledge about each other. (Stewart, 1997)

The simplest relation is with transactions, where sellers simply sell and buyers simply buy. In this case, there is little need for knowledge exchange. On the next level, product solution, the supplier delivers products specifically adapted to fit the customer’s needs. For the product solution to be of use for the customer there must be an exchange of information between the two, an exchange that creates a relationship. (Stewart, 1997)

If the customer seeks a business solution, the product becomes secondary, and the relationship will step up another level. The supplier must have knowledge of the customer’s needs and preferences and a business solution therefore requires an exchange of substantial information about needs and capabilities between the two. If the relationship reaches full partnership, the supplier might take over the management of, the responsibility for, or part of the customer’s business. This requires substantial knowledge and demands the issue of knowledge about the customer’s business to be addressed. (Stewart, 1997)

The conclusion we draw from this is that the tighter relationship, the more dependent success becomes of knowledge i.e. the greater need for knowledge sharing. Therefore we conclude that a successful relationship requires knowledge management.

We also believe that the activity of knowledge sharing is in itself dependent on a tight relationship for incentives and simplicity. It requires logistical bonds of mutual adaptations of routines and systems to simplify the sharing of knowledge. Social bonds are often also prerequisites for knowledge sharing, as the common frames of reference, the trust and the understanding that social interaction builds are essential for knowledge sharing. Technological and knowledge bonds are also essential, since they provide incentives for the sharing of knowledge between organizations. Hence, we believe that successful knowledge sharing requires a tight relationship.

Rehme concluded in his thesis that interdependencies, i.e. bonds, lead to relationships and relationships lead to interdependencies (Rehme, 1998). We
adopt another perspective in claiming that close inter-organizational relationships require knowledge sharing and inter-organizational knowledge sharing requires close relationships.

11.4 Summary of the customer relation dimension

A customer relationship can be described as a number of bonds between the supplier and the customer. The bonds form a network based on mutual adaptations which tightens the inter-firm relationships. The bonds can be divided into social bonds, legal bonds, logistical and administrative bonds, and technical and knowledge bonds.

The bonds create incentives and simplify knowledge sharing. Technical, knowledge and legal bonds create incentives to share knowledge. Legal bonds are probably less effective as incentives because of the difficulty to measure intangibles. Social bonds simplify in creating trust and understanding through social contacts. Logistical and administrative bonds simplify knowledge sharing through adapted routines, processes or systems or simply because of geographical proximity.

Since a tight business relation requires knowledge sharing to prosper, and knowledge sharing requires bonds for incentives and simplicity, we conclude that inter-organizational relationships require knowledge sharing and inter-organizational knowledge sharing requires close relationships.
12 The systems dimension

This chapter describes the intricate task of knowledge transfer and the systems, both people and technology based, in which the knowledge is transferred.

12.1 Knowledge transfer

As defined earlier, knowledge can only reside in people’s minds. This means that knowledge transfer is the process of codifying knowledge in the mind of the originator using information, transferring that information and reinterpreting the transferred information into knowledge in the mind of the recipient.

Some kind of feedback from the recipient to the origin decreases the risk of errors in knowledge transfer. Thus the origin can determine whether the communication has been successful or not, i.e. if the knowledge at the recipient has been distorted by the transfer. Compare with the first criterion for a rich medium that states that in a rich medium, the possibilities are often greater to receive immediate feedback. (Moberg, 1993)

12.1.1 Knowledge transferability

First we will relate to the term knowledge transferability that was introduced previously in chapter ”The knowledge dimension”. Knowledge transferability is how difficult it is to transfer the knowledge. The two extremes on the knowledge
transferability scale are tacit and explicit, where tacit knowledge is the more difficult to transfer (cf. Nonaka & Takeuchi, 1995).

Transferability is about how much the knowledge depend on the context in which it is presented, about how much meaning that would be lost if some or the entire context was removed (Novins & Armstrong). Tacit knowledge also has a cognitive dimension, which is the mental models\textsuperscript{13} beliefs and perceptions so ingrained that they are taken for granted (Nonaka & Takeuchi, 1995). Because tacit knowledge is context specific and personal, it is therefore hard to formalize and communicate (Novins & Armstrong).

If some or all of these cognitive or context specific elements are lost in the transfer, then some of the knowledge is also lost. This means that the knowledge perceived by the recipient might not have the same meaning as the original knowledge. Explicit knowledge or “codified knowledge“ on the other hand, refers to knowledge that is transmittable in formal, systematic language, e.g. in text (Novins & Armstrong; Nonaka & Takeuchi, 1995).

The process of communication is affected by the personal characteristics of people who communicate (Moberg, 1993; Novins & Armstrong). As stated earlier, a person’s frames of reference is important for how he interprets received information. An individual’s frame of reference is all the knowledge that the person already possesses, including his values, beliefs and mental models\textsuperscript{13} (see chapter “The people dimension”). (Romme & Dillen, 1997; Moberg, 1993)

\subsection{Knowledge transfer and media richness}

Different media have different capabilities of transferring knowledge; a medium can be more or less rich. The richness of a medium is determined by its ability to transfer tacit knowledge. A rich medium has a high capability and a less rich medium has less capability of transferring tacit knowledge. That ability can be determined using four criteria. (i) To what extent immediate feedback is possible. (ii) The number of different signals, like the tone of voice, mimics, sounds and gestures it is possible to transfer. (iii) To what extent it is possible to use a natural language. (iv) And finally to what extent it is possible to adapt the communication to the recipients' situation, needs and values. (Moberg, 1993)

\textsuperscript{13} Mental models are internal pictures of the world that shape our decisions and actions (Senge, 1994)
In Figure 20, a number of exemplifying media are displayed on the media richness scale, arranged according to media richness.

![Figure 20 The richness of different media (adapted from Lindström, 1996; Moberg, 1993; Sveiby, 1996)](image)

High quality and efficient communication of knowledge is achieved when the medium has the appropriate degree of richness for the transferability of the particular knowledge (Lindström, 1996; Moberg, 1993). The quality of the transfer is how much of the original knowledge that is distorted due to loss of context. For the quality of the transfer to be high, the medium must have sufficient richness in relation to the transferability of the knowledge (see Figure 21).

Human knowledge is best transferred via tradition\(^{14}\), in social interaction with people, because humans have the capacity to absorb signals unconsciously in face-to-face communication (Sveiby, 1996). Tradition allows people to use their natural language, it allows immediate feedback, it allows people to use mimics, tones of voice and gestures as they please and it builds similar frames of references for people who interact socially for a longer time. This altogether makes tradition the richest medium available and makes it the medium that has the highest quality in a knowledge transfer.

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\(^{14}\) Tradition can be defined as a long term social interaction between people
Figure 21 Medium richness and knowledge transferability (adapted from Lindström, 1996)

If the medium used is richer than needed, on the other hand, there is a loss in the efficiency of the transfer (Lindström, 1996). We see efficiency as a combination of speed - how quick the transfer is, effort - how difficult it is for the people involved, and cost - how much money the transfer costs. Richer media are, because of higher costs, not as well suited for mass dissemination and distribution over large physical distances as some less rich media. This can be illustrated with a comparison of the use of e.g. an apprenticeship to an email for mass dissemination. This is not about the quality of the transfer, which probably is higher using a face-to-face meeting as medium.
Figure 22 Example, using the richness model on a specific knowledge

We will use two fictive examples to illustrate the principles in this model. Figure 22 illustrates where a specific knowledge, knowledge X, is rated on the transferability scale. The model shows a range of acceptable media, on the media richness axle, suitable for transferring knowledge X.
If we similarly place a specific medium, medium Y, on the media richness scale, we obtain a range of knowledge transferability. That range shows for which knowledge high quality and efficient knowledge transfer can be achieved using medium Y.

These are of course very hypothetical examples, since neither the transferability nor the media richness has an absolute scale. The best to hope for is to relate two media or two types of knowledge to each other on the respective scale. Therefore these examples are purely for the purpose of understanding.

12.1.3 Knowledge codification

As we stated earlier, knowledge transfer is the process of interpreting knowledge using information, transferring that information and reinterpreting the transferred information into knowledge. The process of codifying knowledge and interpreting that knowledge using information is done to increase the transferability, i.e. make the knowledge more explicit. Thus tacit knowledge can be moved down the transferability scale towards the explicit end. Nonaka & Takeuchi call this externalization. (Davenport & Prusak, 1998; Nonaka & Takeuchi, 1995)

An example of knowledge codification is the work with this thesis. We have tacit knowledge that we try to codify by writing a thesis. This enables us to distribute
the knowledge to a much broader audience than if everyone would have to listen to our presentations. How successful we are in transferring our knowledge to the readers of this thesis is largely dependent of how well we manage to codify our tacit knowledge using figures and text.

Thus the process of codifying knowledge for transfer is critical to any knowledge transfer system. This becomes obvious when considering the difference between how a good writer writes and is able to make his points, compared to a bad one that might have all the best points to make but is unable to communicate them. For a speaker the situation is of course the same, although the medium is speech instead of text.

12.2 Knowledge transfer systems

We define a knowledge transfer system as the whole system of activities of a complete knowledge transfer. The system includes not only the transfer itself, but also the codification that takes place at the origin and the recipient, see Figure 24.

A knowledge transfer system uses a medium, for example e-mail, telephone, face-to-face meetings, video meetings and tradition. An important task for the knowledge management practitioner is to identify an appropriate medium for the knowledge transfer (Davenport & Prusak, 1998).

We define two basic kinds of systems, people based systems and technology based systems. Our definition of a people based knowledge transfer system is a system that uses a people-based medium for the knowledge transfer. Hence, a technology-based system is a system that does not use a people-based medium for the knowledge transfer. People based media are for example different kinds of face-to-

Figure 24 Knowledge transfer systems
face meetings and meeting routines. People based media are thus differentiated from other kinds of media like information technology and books.

In real situations the two kinds of systems are often intertwined and hard to separate, sometimes they should probably not be separated. In some situations we believe that the people based and the technology based systems should be analyzed as parts of the same knowledge transfer network.

In a strict sense, looking at the whole knowledge transfer system of activities of complete, it is by definition at least partially based on people. It is so because according to the definition of knowledge, knowledge can only reside in people’s minds. This means that there are always, in all complete knowledge transfers, people who codify their knowledge (using information) and interpret other’s codified knowledge. That is why people are such an important part of all knowledge transfer systems.

Data and information are constantly transferred electronically, but knowledge on the other hand travels with the highest quality through a human network i.e. people based systems (Davenport & Prusak, 1998). There are two kinds of people based systems, formal and informal. Formal people based systems are meetings and routines that are formally recognized, informal are systems that are not formally recognized.

Formal systems are often part of the organizational structure, like meetings, routines, groupings (here the medium becomes tradition). Informal systems can be informal networks, people meeting by the coffee machine or during lunch break, it can be friends meeting “off duty” at the golf or the yacht club or someone asking the man in the neighboring office how to write a budget request. (Davenport & Prusak, 1998) Mintzberg also claims that (Mintzberg, 1983):

*Formal and informal systems are often intertwined and indistinguishable.*

Many authors, among them Davenport & Prusak and Nonaka & Takeuchi, talk about how anecdotes and stories are good at transferring some kinds of (tacit) knowledge. MIT\(^{15}\) has even devoted a recent project to research about “learning histories”. (Davenport & Prusak, 1998; Nonaka & Takeuchi, 1995; Kahan, 1998)

\(^{15}\) Massachusetts Institute of Technology
The recent development in information technology is on the other hand one of the factors that has started the interest in knowledge management. The 100 European companies that are spending the most on information technology have for 1999 budgeted $54 billion for information technology (Tate, 1998). Information technology has enabled new ways of work and provided companies with powerful tools for communication over large distances and to many people at a relatively small cost. Information technology is often used to build technology based systems for knowledge transfer.

Technology based systems that are used for knowledge management is most of the times based on Lotus Notes or Web technology. The advantage with Lotus Notes\textsuperscript{16} is that it is an integrated system from one vendor, while web technology on the other hand has a reach that is hard to beat. Almost everybody also knows how to use a web browser and it is very easy to learn for those who do not, and furthermore the browser is independent of local technical standards that can inhibit compatibility.

12.2.1 Levels of knowledge sharing

Another aspect of knowledge transfer systems is the organizational level\textsuperscript{17} at which it is transferred. This regards at what level the knowledge sharing takes place, whether it is on the individual, group or on another organizational level. Both the recipient and the origin of the knowledge transfer can be either one or many persons. This also has effect on what medium that is most appropriate to use in the system. (Nonaka & Takeuchi, 1995; Novins & Armstrong)

\textsuperscript{16} See Lotus web-site at http://www.lotus.com/ for more information

\textsuperscript{17} Instead of organizational level Nonaka & Takeuchi use “ontological level.”
Knowledge managers often, without considering the alternatives, start working at knowledge transfer from one to one or from one to many. This is, as Figure 25 illustrates, only half of the spectrum, not addressing the issues of knowledge transfer from many to one or from many to many. Figure 25 also shows examples of media that could be used for each category of transfer. (Novins & Armstrong)

12.3 Summary of the systems dimension

Knowledge transfer is the process of codifying knowledge in the mind of the originator into information, transferring that information and reinterpreting the transferred information into knowledge in the mind of the recipient.

Those responsible for transferring knowledge must find appropriate ways to code and distribute knowledge. Problems occur when people sharing knowledge have different frames of reference. Feedback from the recipient to the origin decreases the risk of errors in knowledge transfer.

Different media have different richness, i.e. capabilities of transferring knowledge. The richness depends on if feedback is possible, if different signals can be used, if natural language is possible and if it is possible to adapt the communication to the recipient.

High quality and efficient communication of knowledge is achieved when the medium has the appropriate degree of richness. For the quality of the transfer to be high, the medium must have sufficient richness in relation to the transferability of
the knowledge. If the medium used is richer than needed, on the other hand, there is a loss in the efficiency of the transfer.

A knowledge transfer system is the whole system of activities of a complete knowledge transfer, including the transfer itself and the codification that takes place at the origin and at the recipient. Knowledge transfer systems can be people based or technology based. People based systems are best suited for the transfer of tacit knowledge and technology based are best suited for the transfer of explicit knowledge.
The Cycle of Knowledge Sharing

In this chapter, we present the method that we have put together to support a knowledge management initiative. First the method is summarized and then exemplified in further detail.

The greatest danger in times of turbulence is not the turbulence. It is to act with yesterday’s logic.

Peter Drucker

As stated by many authors, for example Davenport & Prusak, knowledge management is a very complex activity. He who wants to practice this intricate trade must be aware of that it means dealing with very complex issues, like a company’s culture, leadership style or organizational structure. (Davenport & Prusak, 1998) In this chapter we present a model that describes the generic phases of a project aimed at increasing an organization’s knowledge performance by better utilizing its knowledge resources.

According to Orlikowski & Hofman, recent research has showed that when working in a world of uncertain rules, it is very difficult to use the traditional model for devising and executing a game plan. In many situations it is neither feasible to predefine the technological changes to be implemented, nor to predict their organizational impact accurately. Planning in such circumstances is more effective as an ongoing endeavor, reflecting the changing and unfolding environments with which organizations interact. (Orlikowski & Hofman, 1997)

Orlikowski & Hofman limit their conclusions to change projects involving information technology. We believe that change projects that include only human related issues have the same deciding prerequisites, i.e. working in a world of uncertain rules, and that the same applies for them. Thus we believe that all knowledge management projects, both those with and those without the technology component can be managed using this philosophy.

As a consequence, we view our model of The Cycle of Knowledge Sharing (see Figure 26), as a never-ending iterative cycle of continuous improvement (cf. Nonaka & Takeuchi, 1995). The activities in The Cycle of Knowledge Sharing should be planned in advance but the plan should only be seen as a guide.
Deviations from the plan should not be considered a failure, but be expected and actively managed. (Orlikowski & Hofman, 1997)

The Cycle of Knowledge sharing goes from \textit{evaluate situation and need} to \textit{focus and analyze} to \textit{set goals and plan activities} to the action phase of \textit{improve knowledge sharing}\footnote{Our methodology has a knowledge sharing focus, supporting the sharing of knowledge that already exists in the unit of analysis. This does not mean that knowledge securing or creation is excluded, but the focus is on sharing and the creation of new knowledge will only be a nice (but not less valuable) byproduct of the knowledge sharing.} back to \textit{evaluate situation and need} before a new \textit{focus and analysis} phase and so on (Spek & Spijkervet, 1997). Here to follow is a presentation of the separate phases:

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{cycle_of_knowledge_sharing.png}
\caption{The Cycle of Knowledge Sharing - the phases of a knowledge sharing project (adapted from Spek & Spijkervet 1997; Olsson, 1995)}
\end{figure}

\subsection*{13.1 Evaluate situation and need}

This can be seen as the last and the first of the phases of a knowledge management initiative. It is the last since it is in this phase that the effect of a possible previous knowledge management activity is evaluated, and the first as it initiates a new activity by identifying a refined or new need.
The **evaluate situation and need** phase is about evaluating the knowledge situation and evaluating the results of previous iterations in The Cycle of Knowledge Sharing, if there are any. This phase also includes relating to the needs, which should be derived from the overall corporate strategies and goals. It is important that there is a purpose and a clear need for everything that is done, and this need should be based on the corporate strategy. This stage can also include inventorying the existing knowledge in the organization, to get an overview and to be able to identify the gaps that needs to be filled. (Spek & Spijkervet, 1997; Davenport & Prusak, 1998)

In specifying the need for certain knowledge, managers must decide what business need that the codified knowledge will serve. This in order to concentrate on what is useful and needed and set goals for the managing of knowledge in the company. (Davenport & Prusak, 1998) This work starts here and ends in the next phase. Spek & Spijkervet and Olsson refer to this phase as **reviewing** and **evaluate** respectively. (Spek & Spijkervet, 1997; Olsson, 1995)

### 13.2 Focus and analyze

This phase consists of focusing using the previously detected needs and analyzing the results from the **evaluate situation and need** phase. It means narrowing the scope and focus on a subset of the knowledge need and to decide on a prioritized focus (cf. chapter “Knowledge and intangible values”). Not all knowledge is valuable and as a consequence, it is important to separate trivial and transitory information from important intellectual assets (Stewart, 1997; Cole 1995) and in addition, far from all knowledge is possible to share or transfer. Therefore it is in this phase the role of the knowledge managers to evaluate knowledge for usefulness and appropriateness (Davenport & Prusak, 1998).

Olsson refers to this phase as **thinking**, to analyze before planning (Olsson, 1995). Spek & Spijkervet call it **conceptualize**: to gain insight in what role knowledge plays, to investigate and to clarify the most needed knowledge (Spek & Spijkervet, 1997).

### 13.3 Set goals and plan activities

This phase is about setting goals, making decisions on required improvements, making plans and considering resources that are needed to execute the activities (Spek & Spijkervet, 1997; Olsson, 1995). The goal setting and planning is important since the creation of intellectual capital, which is what we in the end would like to accomplish (see chapter “Knowledge and intangible values”), does
not take place without a clear purpose (Stewart, 1997). Spek & Spijkervet and Olsson call this phase reflection and plan respectively.

**13.4 Improve knowledge sharing**

This is the phase when the plans are executed, when something concrete is done to improve the sharing of knowledge. Spek & Spijkervet and Olsson both refer to this as the action phase.

**13.5 Relation to the Knowledge Situation Model**

The Cycle of Knowledge Sharing encircles the Knowledge Situation Model, presented earlier in the thesis. That symbolizes our belief that every one of the four phases in The Cycle of Knowledge Sharing probably should consider all the dimensions in the Knowledge Situation Model as they are strongly linked together. However, an iteration in The Cycle of Knowledge Sharing can, and probably also should, focus on one of the dimensions in the Knowledge Situation Model, as long as the other dimensions are considered.

Figure 27 illustrates how the first cycle can focus on what knowledge that need to be shared, the second cycle on how to make people share knowledge more effectively and the third on how to improve the systems for knowledge sharing.

![Figure 27 Example of how the focus can change in the cycle](image)

The order of the focus is likely to differ from project to project depending on the conditions, situation and needs.

Finally, we believe that a holistic approach that considers all dimensions in the Knowledge Situation Model increases the probability of achieving the desired results.
A checklist to help out in the using of the model is found in Appendix A.

13.6 Summary of The Cycle of Knowledge Sharing

Knowledge management is a very complex activity, involving issues like an organization’s culture, leadership style or organizational structure. Planning in such circumstances is more effective as an ongoing endeavor, reflecting the changing and unfolding environment.

As a consequence, we present a model that describes the generic phases of a knowledge management process called The Cycle of Knowledge Sharing. We see it as a never-ending iterative cycle of continuous improvement, going from *evaluate situation and need* to *focus and analyze* to *set goals and plan activities* to the action phase of *sharing knowledge* back to *evaluate situation and need* before a new analysis phase and so on.

The Cycle of Knowledge Sharing evolves around The Knowledge Situation Model, presented earlier in the thesis. Every one of the four phases should consider all of the dimensions in the model as they are linked together. However, an iteration in The Cycle of Knowledge Sharing can focus on one of the dimensions in the Knowledge Situation Model. We also believe that a holistic approach, that at least to some degree considers all dimensions, increases the probability of achieving the desired results.
14 Case one

In this chapter, the practical work done in the first case is presented. First the method and a description of how the practical work is presented, followed by the description of the unit of analysis, and a knowledge situation analysis of the unit of analysis. A note for the reader; all analysis made by the authors is marked with italic text.

14.1 Purpose

Case one served the specific purpose (see chapter “Thesis scope”) to “improve the exchange of knowledge between ABB and the customers in the case study” and to deliver “a proposal that suggests how to implement a solution designed to improve the exchange of some knowledge between the different ABB companies, the ABB customer team and the customer in the case study”.

For the academic purpose, case one provided us with an opportunity to test the analysis tool and put our theoretical knowledge into practice, to bable to guide others in the usage of our model.

14.2 The unit of analysis

The unit of analysis in the case study is the customer team and people, or groups of people, at the ABB companies and the customer, that are relevant for studying the sharing of the prioritized knowledge. There are several organizations in the unit of analysis, customer X, the ABB companies selling to customer X, and the customer team, all of which from now on will be referred to as entities.
Customer X

The customer in case two is a process industry and part of a large corporation. It is in this thesis referred to as customer X and the corporation as a whole is referred to as the customer X corporation.

Customer teams - a form of relation marketing

The customer team is the organizational unit at ABB that is responsible for all ABB’s sales activities towards the specific customer. The customer team consists of a core team and a group of people more loosely tied to the team, the customer team information group. The customer team information group does not participate in the day-to-day work of the team but do receive information about the team’s work and are occasionally called to the meetings if their participation is needed.

![Figure 29 Customer team and information group](image)

The customer teams are seen as a way to expand business in particular “blind spots”\(^{19}\) for ABB companies, but it has also to do with the level of coordination required by the customer who wants more complex functions (Rehme, 1998). Customer teams are, in short, ABB’s version of relation marketing (see chapter “The customer relation dimension”).

14.3 Method in Case one

In this section, we give a detailed description of how the study was conducted.

14.3.1 Selection of case

Why was the customer in the unit of analysis chosen to be the case customer? Among other things, the relation with the customer is very fortunate. ABB knows

\(^{19}\) A blind spot is a word for when there is an unsatisfied demand from the customer that ABB could satisfy.
the industry and is a strategic supplier to the customer (see chapter “Knowledge and intangible values” for definition). Personal relations are also exceptionally good between people at ABB and the customer.

Customer X is also a customer of favorable size. A small unit of analysis simplified our delimitation and increased the chances for the project to succeed. The timing was also excellent as the customer and ABB were finishing a very successful joint project.

We also agreed to focus on a joint initiative involving the customer, as it reduces internal political problems within ABB.

14.3.2 Conducting the case studies

Method for the interviews

We used a structured base for the interviews to be able to compare the results of the different respondents, but we also allowed unstructured questions outside the frame in order not to miss out on relevant additional information.

During the interviews, we have been careful to take double notes to check the results and not to leave out anything important.

We have for every interview carefully guarded the anonymity of the source and also informed the respondent of this before the interview. We did this to limit the risk of having the respondent answer untruthfully because of fear that critical answers might make him unpopular with the management.

Selection of respondents

We interviewed representatives of both the customer and ABB. We were careful to find respondents from different levels and departments, to get as complete a picture as possible of the knowledge needs of the organizations.

14.3.3 Knowledge need analysis

Case one started with limiting the focus for the case study and we decided to focus on knowledge needs. Since we had to narrow our focus further than that, we also decided to prioritize and concentrate on the most important knowledge, to one or a few areas of knowledge with the highest potential value for the involved parts.
In the context of the Cycle of Knowledge Sharing, the work was emphasized on the phases, *evaluate situation and needs, focus and analyze* and also *set goals and plan activities*. The focus in the Knowledge Situation Model will be on analyzing according to the *knowledge* dimension and then analyze the other dimensions out of the perspective of the prioritized knowledge.
The picture in Figure 31 gives a representation of the respective activities in the study, following now is a description of each activity in the figure.

**Business and knowledge need prediction**

The first activity was the prediction of the business needs of the entities in the case. We started from an estimation of the basic needs of a process industry and basic the needs of a major supplier to that industry.

Preliminary knowledge needs were identified by using the business needs and from them deriving the corresponding knowledge needs. A presentation for a reference group validated the result of the prediction of knowledge needs (see number 2 in Figure 31). The reference group contained two senior consultants at ABB Management Consultants, two senior managers of the Swedish Market organization, and the customer team leader for the customer team in Case one. During the presentation, the reference group made comments on the predicted knowledge needs and their order of priority.
Maximum list of knowledge areas creation and usage

In order to further validate if there were other knowledge needs than those agreed on by management, we decided to conduct a number of interviews (see number 1 in Figure 31). In the interviews we asked people what they knew, what they wanted to know, who else knew and how important they thought the different areas of knowledge were to their business.

We based the interviews on a “maximum list of knowledge areas,” which is a list of about 150 different knowledge areas that we thought might be of interest for the respondents. The reason for this was not only to find out the importance of, but also the need for, a particular knowledge, and where that knowledge resided in the unit of analysis. The interviews were conducted in a very informal fashion, and many, often unprepared, questions were added to the interview to give additional information.

Aware knowledge and knowledge need

The idea with an interview based on a maximum list was to include as many possible examples of knowledge as possible, and then ask different representatives of the entities what they thought was important, unsatisfying etc. Thus the maximum list of knowledge areas was used as a kind of checklist not to miss any knowledge areas. Later the interviews showed that it was not the actual knowledge areas in the maximum list of knowledge areas that was most useful, but the discussions that was derived from them.

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20 See chapter “Method” for analysis and detailed description of the model

21 See Appendix D for the entire list
We asked people what knowledge they had and what knowledge they wanted to have. This limited the answers to the two left quadrants of Figure 32. The respondents answered with the knowledge and the lack of knowledge that they were aware of. Thus the results of the interviews was the aware knowledge and the aware lack of knowledge.

**Is it possible that we picked the wrong knowledge as the most needed?**

There is always a risk that we picked the wrong knowledge as the most needed. To find out what different stakeholders think is valuable, we focused on investigating the individual business needs and knowledge needs of the participants, as they saw it. But we also believe that there are other needs, and therefore other values, than what respondents are aware of, admit or remember. If there are unjustified stated needs, situations where people claim that they need what they in fact do not, no value is created from satisfying that need. Those needs are imaginary needs. We believe that the need for knowledge about bugs and defects, which we later concluded to be the most needed knowledge area, is not an imaginary need. It was repeated by most of the respondents and also coincided with the predicted knowledge needs.

**14.3.4 Analysis of the knowledge situation**

We then completed the list, narrowing the knowledge needs down to but a few. For the knowledge found to have the highest priority, a more thorough investigation was made. This investigation had the purpose of analyzing the factors that had the most effect on how the needed knowledge is shared. The characteristics of the knowledge, the organization, the involved people, the systems and the customer relation were analyzed to serve as a basis for our suggestions to improve the sharing of the most needed knowledge. For this
investigation, the most central model in our thesis, the Knowledge Situation Model, was used.

14.3.5 Planning the initiative

The next step was to develop a few solution suggestions to match the most needed knowledge. We came up with five different suggestions for the exchange of different knowledge (see Appendix C for brief descriptions).

The knowledge in the different alternatives was analyzed in terms of transferability and applicability (see chapter “The systems dimension”), and out of that analysis, an evaluation of their general and specific value was made (see chapter “Knowledge management and intangible values”).

The suggestions and the analysis were presented for representatives of ABB Management Consultants, ABB Future Center, the Swedish Market organization, customer X, the customer team and the ABB company in question for the solution. During these presentations, we agreed on the fact that a solution program concerning bugs and defects on products delivered by ABB was suitable to go forward with and plan in detail.

14.3.6 Implementation and evaluation

The next phases will be implementation, and another evaluation; to connect back to the knowledge needs and to measure to what extent the knowledge needs were met and if they have met the business needs. The phase will give a new situation that will serve as a basis for another iteration, a new start in the never-ending cycle. Because of the relatively small time frame for this project, it will not include these phases of The Cycle of Knowledge Sharing.

14.4 The customer relation dimension

In this section, the relation between ABB and customer X will be described according to the customer relation dimension in the Knowledge Situation Model (see Figure 33).
14.4.1 Social bonds

The social bonds between ABB and customer X are very strong. They are the result of a long-standing work relation. This shows in the informal relationship that ABB’s salespeople have with some key people at customer X.

There are many personal relations between the two companies, which makes the social bonds less vulnerable as it is not dependent upon one single employee. On the other hand, most of these employees approach retirement.

14.4.2 Logistical and administrative bonds

The distance between ABB and customer X is only 20 kilometer, which gives ABB an advantage over its competitors as ABB’s service technicians can arrive at customer X in a very short time.

This is of great importance since customer X is a process industry for which it is very critical having fast access to service personnel. A stop in customer X’s production costs several tens of thousand SEK per hour. This creates a very strong logistical bond with customer X.

However, routines and systems are not connected and adapted for knowledge sharing (see chapter “The systems dimension).

14.4.3 Technical and knowledge bonds

The customer has in his business made ABB’s standards his own standards. The products that ABB supplies is clearly critical to the performance of customer X’s business. If customer X wanted to change supplier for these products he would, besides exposing himself to the big risk involved, either be forced to change to
another company’s standard or deal with several different standards in his production facilities.

Switching technologies would be a large investment and as such a large risk. All technicians who are familiar with ABB’s technology would also have to learn all over again. Dealing with different technical standards would inevitably mean interface problems and technicians having to learn and work with two different technologies, which would probably cause more down time in the production.

*Altogether, this ties customer X very hard to ABB, and thus the technical and knowledge bonds between customer X and ABB are probably the strongest of all bonds.*

### 14.4.4 Legal bonds

There exist no legal bonds to share knowledge between customer X and ABB.

*It seems that the technical and knowledge bonds provide sufficiently strong incentives to motivate knowledge sharing between customer X and ABB which makes legal bonds redundant.*

### 14.5 Knowledge needs

These are the knowledge needs for each of the entities in the unit analysis. The knowledge needs were determined as presented earlier in this chapter.

#### 14.5.1 Common knowledge needs for all entities

There are two common knowledge needs for all three entities. First there is a need to know characteristics about and who key people in the customer team, at customer X and the ABB companies are. Everyone in the customer team is considered to be key people. At customer X and the ABB companies, the key people are managers and some are influential technicians. There is a need to know about these peoples' name, how they look, internal position, other function they might have (for the members of the customer team), background, areas of competence, what ABB company, contacts, personal interests and other assorted background information.

There is also a need to know about who knows what in the unit of analysis, who at ABB or customer X that has knowledge about a specific technology or a specific process.
14.5.2 Customer X’s knowledge need

The most prominent knowledge need, discovered at customer X, is the need to know about defects and malfunctions on ABB’s products. Almost all of the respondents mentioned this as a very important knowledge that they would like ABB to share with them. They would also like to know about what the effect of the defect is and how to prevent downtime on machines due to the defect. People at customer X would also like to know about what experiences ABB and other customers have made in maintaining ABB’s products.

All these needs stem from the business need to increase the degree of utilization, which means avoiding downtime due to equipment malfunctions (see Appendix B).

Knowledge around process and process development does also have a very high priority for customer X, knowledge that ABB has acquired at other customers. The communication of technical data and specifications seems to be insufficient, several of the respondents expressed a need for improvement.

These needs stem from the business need for a high product quality and for increased capacity, which is achieved by optimizing the manufacturing process.

Then finally, people at customer X would also be interested in finding out about ABB’s product development ideas and visions.

This could help them anticipate what will come in the future and thus be able to stay up front in the development.

14.5.3 ABB’s knowledge need

These are the knowledge needs that were revealed in the interviews. The interviews with the ABB representatives gave a picture of a less uniform knowledge need than that of customer X. The representatives from ABB that were interviewed were all sales people engaged in the work with customer X. They were also all members of the customer team. These are the knowledge areas that the respondents pointed out they would like to have more knowledge in. No order of priority is intended.

- The customer corporation’s plans and visions for customer X.
- Knowledge about bugs and defects on ABB’s products, the effect of those bugs and how to prevent them.
- Information about how deliveries to customer X is going, especially if they are not going well.
• Knowledge about plans and visions in ABB’s product development.
• Relevant experiences from other parts of ABB, from working in other projects and with other customers.
• Knowledge about where in ABB different kinds of knowledge reside (who knows what).

Since less background information is available for ABB’s knowledge needs than for that of the customer, these knowledge needs are only presented in the form of a bulleted list.

14.6 The knowledge dimension

The knowledge dimension is the dimension that is in focus in Case one and thus the recommendations for Case one will be based on the analysis in this section.

![Figure 34 The knowledge dimension](image)

In this chapter, we analyze the applicability and transferability (see chapter “The knowledge dimension) of the most needed knowledge resulting from the analysis of the knowledge needs. We then present an analysis of the availability, i.e. form, time and location of the most interesting knowledge in our case result, knowledge about bugs and defects.

14.6.1 Applicability and transferability

We used the applicability and transferability model in order to distinguish the knowledge that has the highest potential value if leveraged across a larger part of the organization. The model was applied on a collection of the knowledge need
areas that could be in question for a knowledge management initiative. The chosen knowledge areas were:

1) Key-people at ABB and their competencies

2) Knowledge about processes and process development that ABB has acquired in working with other customers

3) ABB’s ideas as regards product development.

4) Knowledge about the effect of and how to prevent bugs and defects on products delivered from ABB to customer X

5) Knowledge about what bugs and defects that are to be found on products delivered by ABB to customer X.

6) Key-people at customer X, with some background information

Figure 35 shows how these knowledge areas rank when inserted in the model, and below is the reasoning that led to the rankings.

![Figure 35 Applicability and transferability of the most needed areas of knowledge in Case one](image)

*The applicability of* knowledge about what bugs and defects that are to be found on products delivered by ABB to customer X (5) and knowledge about the effect of and how to prevent bugs and defects on products delivered from ABB to customer X (4) *is rather general, as many different organizations can benefit from this knowledge. Different service units within ABB can use it to serve customers better and so can other customers who have bought similar products. All the entities in the unit of analysis can similarly benefit from better leveraging of this knowledge. The specific customer can prevent downtime and the ABB product company, which has constructed the products, can use it to modify and improve them. The knowledge therefore ranks high on the general scale (see Figure 35).*
The transferability of the knowledge about the existence of the bugs and defects (5) is explicit and therefore easy to transfer between the organizations using a not that rich medium. The knowledge about the effect of and how to prevent bugs (4) are more tacit and therefore require a richer medium for transfer (see Figure 35).

Knowledge about key-people at ABB and their competencies (1) is rather tacit as the complexity of knowing and judging a competence is rather tacit. Knowledge about key-people at customer X (6) is more explicit, as competencies not are included. Both knowledge areas are quite specific for the unit of analysis, although the knowledge about the ABB competencies is less specific as it can be useful for other customers in the same industry (see Figure 35).

Knowledge about processes and process development that ABB has acquired working with other customers (2), we judge the most tacit as it is both complex and hard to express. We judge it to be more complex than ABB’s ideas as regards product development (3) as they more easily can be transferred and explained in a meeting. To transfer knowledge about process development, we believe that a very rich medium has to be used. Both examples of knowledge place rather high on the applicability scale, as they are useful not only to the specific industry, but to other industries in ABB (see Figure 35).

14.6.2 Focus on “bugs and defects”

From now on the knowledge areas 5 and 4 (see above) will be treated as one, and be referred to as knowledge about bugs and defects.

As shown in Figure 35, the knowledge area knowledge about bugs and defects ranks very high in both transferability and applicability. The customer also named knowledge about bugs and defects as his most prominent knowledge need.

The interviews also showed that the customer has some knowledge about specific bugs and defects on ABB’s products, knowledge that other customers and ABB most certainly would be interested in having. This knowledge could be shared with other customer and could be used by product developers to improve ABB’s products.

Knowledge about bugs and defects would be valuable in many ways. Specific value would come out of a better functioning process for customer X. Specific value would also come in the form of better service resulting in a better relation between the customer and the ABB companies selling to the customer X. General value would derive in the form of a possibility to serve other customers better and thus improving the relations with them.
This altogether is convincing; knowledge about bugs and defects has a big potential and it would be possible to focus on sharing this particular knowledge. Therefore a decision was made to focus all further work in this case on how to share knowledge about bugs and defects between ABB and customer X.

### 14.6.3 Availability

Knowledge about bugs and defects is likely to be found at several locations. With the customer, it is to be found in tacit form with the technicians conducting maintenance and with Customer X documented in explicit form. ABB Service, which is doing service on these products, similarly has the knowledge documented explicitly and in tacit form in the heads of the service technicians.

The product company has a different type of knowledge, resulting from having constructed and tested the products before placing them on the market. This knowledge is also bound to be found in tacit form in the heads of workers, but also to some extent documented in explicit form.

### 14.7 The systems dimension

The systems dimension of the Knowledge Situation Model is in this section analyzed to give an overview of what channels for knowledge transfer that at present exist between the customer team, customer X and ABB.

![Figure 36 The systems dimension](image)

The focus in this analysis will be on the systems for exchange of knowledge about bugs and defects on ABB’s products.

It can be concluded that there is no formal, technology or people based, system for the transfer of knowledge about bugs and defects on ABB’s products between ABB and customer X.
14.7.1 People based knowledge transfer systems

There are no formal routines in the customer team for collecting and disseminating any type of knowledge. The only comparable routines are the informal habits of exchanging information about what is happening at the customer, if there are any problems, rumors, etc.

The main channels for knowledge transfer between ABB and customer X are informal meetings between members of the customer team or ABB’s service personnel and employees at customer X.

14.7.2 Technology based knowledge transfer systems

Most contacts between customer X and ABB are informal meetings, phone conversations or emails, but during the last recent project with customer X, some ABB employees assigned to the project worked at the customer’s plant on customer X’s network, to simplify communications.

Within ABB, the system to support and document the work of the sales-persons is Caesar, a system used by a number of ABB companies. There is also a customer team database in Lotus Notes, which is intended to provide a virtual meeting place for the team members and document work in the team. This is up until recently left unused, partly because the team members are not accustomed to use computers, partly because of the lack of need for a virtual meeting-place as most team members work in the same building.

ABB is currently using Lotus Notes for a lot of things, and so is the customer. This makes it likely to assume that an attempt to create a common system to support knowledge sharing between the two companies will have Lotus Notes included in it.

14.8 Conclusions

We conclude that incentives to share knowledge are strong due to technical and knowledge bonds. Strong social bonds provide simplicity for knowledge sharing but so far administrative routines and systems are not connected nor connected for knowledge sharing.

The knowledge area knowledge about bugs and defects ranks very high in both transferability and applicability, and the customer named knowledge about bugs and defects as his most prominent knowledge need. The interviews also showed that the customer has some knowledge about specific bugs and defects on ABB’s products, knowledge that other customers and ABB most certainly would be
interested in having. Both specific value and general value would derive from an exchange. We conclude therefore that knowledge about bugs and defects is most suitable for knowledge sharing between customer X and ABB.

There are a lot of informal contacts and meeting, but few systems involving less rich media to support the sharing of explicit knowledge between the two companies. One can easily be constructed, however, as both companies are currently using Lotus Notes.

A system for knowledge sharing would have to be adapted to the large distances between people with knowledge about bugs and defects and to the richness required to transfer the knowledge. A system for sharing knowledge about bugs and defects should be both technology based and knowledge based. We believe that a technology based systems is suitable to connect the remote technicians in the product company and at ABB, but that it is important to connect names to every entry so that follow ups, contacts and meetings are made possible to transfer more tacit knowledge about why bugs and defects occur and how to solve the problems.

This suggestion would enable for knowledge about bugs and defects to reach decision-makers in the different ABB companies and at customer X.

It is also possible that the incentive structure has to be adapted to support the exchange of knowledge about bugs and defects. We believe that small rewards could be awarded those who find bugs and suggest solutions to defects and problems.

14.9 Recommendations for Case one: To share knowledge about bugs and defects

We recommend that a technology based system for the sharing of knowledge about bugs and defects is built (see Appendix C for a brief description).

We believe that a technical media in the form of a database, in Lotus Notes or on a web site, is appropriate to connect the remote technicians in ABB’s product companies and customer X’s technicians. In this database information about bugs and defects on ABB’s products should be stored. The information should include a brief description of the defect, its symptoms, and which products that are affected. It could include not just defects, but also problems that can occur when the products are integrated with other systems.

We believe that it is important that each entry in the database has a name attached to it, a name of someone that is responsible for and knowledgeable about the
specific defect and its characteristics. This person should have a clear motivation to work with these issues and also have some or all of his time dedicated to it. This enables the creation of formal and informal relations and networks. Thus more knowledge can be transferred than the explicit knowledge that is transferred through the database. The tacit knowledge could be knowledge of why bugs and defects occur and a deeper understanding of how to solve them.

In order to make the knowledge exchange successful, we recommend to ensure that all involved managers understand the benefits of the sharing of that knowledge. The managers must later adapt the incentive structures and leadership of the organizations to motivate the involved technicians to share knowledge until a culture of knowledge sharing is obtained. Simply creating a system for knowledge sharing will not do.
15 Case two

In this chapter, the practical work done in the second case is presented. First the method and the practical work is presented, followed by the description of the unit of analysis, and a knowledge situation analysis of the unit of analysis. A note for the reader; all analysis made by the authors is marked with italic text.

Case two is an assessment of the knowledge situation between ABB and customer Y and the purpose is to describe the current situation using the knowledge situation model. The purpose is also to reveal potential improvements in the relation between the two by analyzing ABB’s interaction with the customer using a holistic approach. Method in Case two

First we conducted an interview with the customer team leader and CAB group leader. Thereafter, we made a preliminary Knowledge Situation Analysis of the situation. This accomplished, we confirmed our facts and validated our interpretations and conclusions in a presentation for the customer team and CAB leader. Finally, we finished the analysis and documented it in a summary in Swedish that was sent to the customer team and CAB leader.

15.1.1 Analysis model

The situation will first be described according to the Knowledge Situation Model. Then an analysis of the circumstances in the situation will be made, which will reveal potential areas of improvement to enhance knowledge performance.

15.1.2 The work in Case two

The work in case two started with an interview of the customer team and CAB group leader (which is the same person). Together with him, we analyzed the situation between ABB and customer Y according to the Knowledge Situation Model (see number 1 in Figure 37). This gave us material to produce a preliminary analysis of the situation. That preliminary analysis was later presented to and

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22 CAB stands for Customer and ABB Business development

23 Knowledge performance is how effectively an efficiently an organization creates value by utilizing its knowledge resources (own definition)
discussed with the customer team leader (see number 2 in Figure 37). The discussion gave further indications, mainly as to the correctness of the facts accounted for, but to some extent also as to the accuracy of the analysis that had been made.

After the presentation and discussion, the work continued with some further analysis and additional conclusions and advises for the customer team leader. Finally, the last version of the knowledge situation analysis was summarized in a more article-like form, in Swedish, for the customer team leader to use for spreading the new innovative ways of working with the customer.

15.1.3 Delimitation

The work in Case two will in the context of the Cycle of Knowledge Sharing be emphasized on the phases, evaluate Situation and needs, and focus and analyze (see Figure 38).
During the half-cycle in the Cycle of Knowledge Sharing (see Error! Reference source not found.) that we perform in case two, the focus will be on analyzing according to the **people**, **systems** and **customer relation** dimensions of the Knowledge Situation Model. We leave out the knowledge and part of the **organization** dimension not associated with leadership or incentives, partly because of lack of information, and these dimensions are treated only briefly and then in the context of the other dimensions.

The customer team will in this case study be mentioned in the analysis, but no conclusions are drawn from the analysis. This is due to the fact that we have put the focus on the CAB cooperation and that has left less time and space for the customer team.

15.1.4 **Unit of analysis**

Case two is delimited to the relation between ABB and customer Y. Thus the relation between different ABB companies and the relations between different ABB-people in the groupings who interact with customer Y are excluded.

15.2 **The systems dimension**

ABB has a customer team for customer Y, as for every major customer. There is also a cooperation that functions independently of the customer team called the CAB cooperation.
The purpose for ABB of both CAB and the customer team is to act as “one ABB” towards the customer. CAB is on a more operational level than the customer team, which is also more for ABB internally.
### Figure 40 Systems for knowledge sharing in Case two

All systems, people and technology based, for knowledge transfer used in the unit of analysis are displayed in Figure 40. This is done to describe what entities of the two organizations that are connected with each other and how, i.e. with what systems, they are connected. The diagram is also a way of illustrating how the results of e.g. the CAB cases are communicated to different entities in the organizations. The gray areas in the model represent redundant areas already covered by another area or, in between customer Y and ABB, covered by all other areas.

<table>
<thead>
<tr>
<th>CAB group</th>
<th>CAB projects</th>
<th>Customer Y</th>
<th>Customer team</th>
<th>ABB</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABB</td>
<td>• Through the CAB members</td>
<td>• Some people take part in the CAB projects</td>
<td></td>
<td>• Contacts through the CT members</td>
</tr>
<tr>
<td>Customer team</td>
<td>• Some people are the same</td>
<td>• CAB site</td>
<td></td>
<td>• CT Meetings</td>
</tr>
<tr>
<td>Customer Y</td>
<td>• Through the CAB members</td>
<td>• People take part in CAB projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAB projects</td>
<td>• One or two CAB meetings</td>
<td>• Irregular meetings when needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAB group</td>
<td>• CAB meetings every fortnight</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

`CAB` CAB
15.2.1 The CAB cooperation

The representatives from customer Y in the CAB cooperation are managers working with technical issues on the operational business level of the customer. The representatives from ABB are all taking active part in the customer’s business on an operational level as well.

The CAB cooperation is based on a regular three-hour meeting that takes place every two weeks. The CAB meetings are focused on dealing with “CAB projects”. A CAB project is an issue for which the CAB team has started a project to investigate and to improve ABB’s or the customer’s business. CAB projects are problems that need to be solved, and for each problem a CAB project is created. After a project is created, the CAB group acts as its steering committee. The projects involve people at both ABB and customer Y.

There is a fixed agenda at the CAB meetings, which starts with a review of active CAB projects. At this point in the agenda each CAB project is treated. The projects are reviewed in general terms to see how each project in doing. Then a run-through of the CAB project bank is done. The CAB project bank is a collection of ideas for improvement that has not yet been initiated and made into projects.

When a CAB project is initiated, a person within the CAB group is assigned as responsible and someone outside the group is assigned as project leader (the project leader can for small projects also be the same as the responsible person in the CAB group). A start document is composed for each new CAB project. It contains a brief description of the project, the name of the person responsible in the CAB meeting and of the project leader.

The functions of secretary and chairman for the meeting rotate among the participants. This is done to make everyone feel that they are taking part, force everyone to speak and also to ensure that the documentation is done.

The CAB cooperation is only concerned with operational business issues. This excludes all discussions about selling or buying, which is a prerequisite for the cooperation to work.

*If these issues were not banned, they would risk taking time from the CAB projects at the meetings, as they are often very hot topics. They could even in the worst case also freeze positions and terminate the whole cooperation (quoting the customer team leader).*
The formal CAB meetings have restricted the informal contacts between ABB and customer Y, which also was the intention of the customer team leader that initiated the meetings.

More formal meetings have the advantage that clear goals are set for the meetings and the results are measured and documented, which make them more visible. Visible results make it easier to motivate the allocation of needed resources. Visible results also let the people involved in the different activities to see clear results, which motivates them.

The CAB cooperation has a dedicated time of three hours every two weeks. Everybody that does not have anything else that is very important to do will come to the CAB meetings.

This shows that in the CAB cooperation people have understanding for the importance of the CAB group meetings.

15.2.2 The customer team

The customer team is, as in Case one, a small group of representatives from some of the ABB companies that sell to the customer (see description in Case one). The meetings in the customer team are held approximately once a month, but very irregularly.

All members in the customer team are people responsible for sales activities at some level.

This is of course the competence needed in the customer team, which has the purpose of coordinating sales.

The customer team does not have an exactly specified amount of time for the cooperation.

15.2.3 Technology based systems

All documentation about the CAB cooperation is accessible to all CAB group members via a web site. The documentation includes meeting protocols, active, potential and finished CAB projects, other news and some background information about the people in the CAB cooperation group.

The customer team share a Lotus Notes database which all members have access to. The database contains many functions, some of which are very sparsely used.
and others are not used at all. These are the functions of the database with comments about their usage at present (11 January 1999):

- Discussion forum: not used at all
- Post-it board: not used at all
- Recent activities: not used at all
- Business opportunities: used for one business opportunity
- Document archive: used for two documents
- Meeting protocols: some protocols are entered by the customer team leader
- ABB’s received orders and total order amount for the specific customer: all data is in place

Both the CAB team and the customer team use email and of course telephone as means of communication.

*ABB has in CAB the opportunity to affect the way in which customer Y does business, which in the end can lead to more selling.*

15.2.4 Measuring the values derived

The customer team leader and CAB leader stressed the importance of measuring the impact of the relationship, but he also underlined the risk of having a too shortsighted view of things. The measuring of the total downtime of the customer’s process is also the overall measure of the performance of this group. The CAB group has succeeded when the downtime decreases.

*This means that the focus is on local value for the customer, and that any other value for ABB as a whole, or for other customers, is regarded as an interesting side-effect. We think that this is fortunate. In measuring, the group looks at both the trends and the positive effects of the cooperation, which also is a good thing.*

The CAB cooperation has to show positive results after three years in order to justify the dedicated resources.

*It is positive that management has chosen to provide a longer time before the CAB initiative has to prove results. We believe that due to the complex cultural and inter-organizational relational issues involved, an initiative like this needs some time to evolve before it functions well and before results can be proven.*
15.3 The organization dimension

In the organization dimension, the attributes of leadership and incentive structure will be analyzed.

15.3.1 Leadership

The CAB cooperation has received top-level management support from both ABB and the customer. Top-level management in both companies expressed their support for the cooperation with customers and deliverers respectively. They also specified the resources, i.e. people’s time, which should be dedicated for the CAB cooperation. Management from both ABB and the customer also participate in the actual meetings, lower level management but nevertheless managers.

Before the CAB cooperation received support from top-level management, the work in the CAB group had low priority with the CAB group members. The meetings were irregular and commitment was lacking.

Hence, management support for the CAB cooperation is profound. Thus the cooperation is given legitimacy and an understanding for the needs and benefits is established. This also makes it a lot easier for the participants to argue for the resources they need and for them to persuade other people to participate.

As for the customer team, management at the ABB product companies is hesitantly positive towards the idea. This is due to the fact that the benefit for their companies is not very obvious. The benefits for ABB as a corporation are clear but the individual product companies can in the worst case loose from participating in the customer team.

This leads to signals from product company management to the customer team members that are not beneficial for the knowledge performance in the customer team. The occurrence of signals from leaders that indicate that the work in the customer team is not very prioritized is very negative for moral and give disincentives to active participation.

15.3.2 Incentives structure

Social and leadership incentives are the most important incentives, both for the CAB cooperation and the customer team.
Social incentives

Social incentives are the most important incentives to exchange knowledge in the CAB cooperation. A kind of craftsman’s pride, a wish to do a good job and to achieve results is thought to be the single most important incentive.

In the customer team, the social incentives to share knowledge within the team are weaker. The group is less homogenous and the participants do not know each other as well, which weakens the social incentives. The social incentives to share knowledge with the customer, on the other hand, is for some customer team member strong, as some of them have strong relations with people at the customer Y.

Leadership incentives

The CAB cooperation was given a strong leadership incentive when it received top-level management support (see chapter “The organization dimension”).

Since the leadership in the customer team is somewhat hesitant to the whole idea of customer teams, the leadership incentives are weak or even negative. It should be noted here though, that this differs between the ABB product companies. Some of them are very positive to the customer teams.

Other incentives

There are no monetary incentives or status related incentives connected to how well the individuals or groups exchange knowledge.

Conclusions about the incentives

For the members of the CAB-group, we believe that the incentives are adapted to the situation. The leadership incentives and the social incentives are sufficient to ensure the functionality of the team.

We also believe that the members in the customer team have their loyalties chiefly with the ABB product companies that employ them, and that they lack clear incentives to share knowledge with their peers from other ABB companies. (Cf. incentives in case one) This is due to the attitudes towards the customer teams that the leadership in the product companies has. To this can be added that their social connections to customer Y is not dependent of the customer team. He who has contacts with the customer might as well go directly to him.
15.4 The people dimension

In the people dimension the attributes of the organizational culture first will be analyzed, and then shortly the frames of reference.

15.4.1 Organizational culture

The organizational culture is an important aspect of the relation between ABB and customer Y.

Trust

The very trustful relation between ABB and the customer is demonstrated in the CAB cooperation. ABB and customer Y talk together about specific problems in both ABB’s and the customer’s respective organizations. For this to be possible there must be a very sincere dialogue in which the participants are willing to reveal information that could be harmful if the other part does not handle it carefully. The customer is measuring the performance of ABB’s products using a very hard measure, which is also being recognized as correct by ABB. The purpose of this is to set high goals for the work. If the results of these measurements would be used in the, for ABB, wrong way, they could make ABB look very bad. That could cause great damage to the relation between ABB and customer Y, and also be very negative for ABB’s potential sales to customer Y and other customers. Customer Y, on the other hand, lets ABB look into their core business, although they know that ABB is also selling the their competitors. Therefore it is possible to say that the relation in the CAB cooperation between ABB and customer Y is very trustful. We strongly believe that the trustful relation is a prerequisite for the CAB cooperation to work.

Altruism

Although there are exceptions, the people in the unit of analysis are generally willing to share knowledge without demanding compensations, even with people from the other companies. In comparison, the altruism in the CAB group is deeper than in the customer team.

However, there are people at the customer who, because they possess unique and business critical knowledge, have become very valuable to customer Y. Unwilling to risk loosing this advantage over their peers, they have started to hoard their knowledge. This affects of course also ABB’s possibilities to obtain this specific knowledge.
Understanding

As for the participants in the CAB meetings, the cooperation itself builds understanding since the communication in the CAB cooperation is based on important, often operational and straightforward, business problems and focuses on solving them through the exchange of knowledge. When the participants see how it is possible to solve problems by having a sincere dialogue, i.e. exchange knowledge, they realize the benefits of the exchange.

The understanding of the need for knowledge exchange between the people that do not participate in the CAB meetings is probably not as good as for those that are closest to the benefits.

The fact that the CAB is more carefully measured and monitored does probably make it easier to “sell-in” the activity than that of the other customer team, which benefit is doubted.

The understanding of the benefits of the customer team vary between the organizations. This is illustrated by the fact that management in some of the participating companies are hesitant to the idea.

15.4.2 Frames of reference

The people in the CAB cooperation now have compatible frames of reference. This was not the case with everybody in the beginning, but since the group has been having meetings for about two years, common frames of reference have developed. This becomes obvious when new members are added to the team as they had to learn to understand the language of the group.

Thus it can be said that the CAB group have sufficiently overlapping frames of reference. Similar frames of reference can also be assumed for the customer team since the people in the customer team all are ABB-people with roughly the same background. They are mostly engineers that now have shifted to working with sales.

15.5 The customer relation dimension

The most important bonds in the customer relation are the technological and knowledge bonds, and therefore they will also be in focus in the analysis.
15.5.1 Social bonds

There are strong social bonds between the participants in the CAB group, but they are vulnerable. If two persons can not get along, it can create problems for others too. This is however an exception, most of the time people get along just fine.

15.5.2 Legal bonds

There are some legal agreements about service deals, but none is related to knowledge transfer.

15.5.3 Logistical and administrative bonds

None of customer Y’s administrative routines has been adapted to those of ABB. It is ABB that has adapted its routines to those of customer Y.

The cooperation is somewhat dictated by the customer, which is probably due to the fact that the customer Y corporation is a very large corporation and also a very large customer to ABB.

15.5.4 Technical and knowledge bonds

The customer has, as in Case one, made ABB’s standards his own standards, and the products that ABB supply is clearly critical to the performance of customer Y’s business. If the customer would like to change supplier for these products he would have two choices, change to another company’s standard or deal with several different standard in his production facilities.

Switching technology would be a large investment and a large risk, all technicians at customer Y would have to learn the new technology. Dealing with different technical standards would inevitably mean interface problems and technicians would have to learn and work with two different technologies, which would probably cause more down time in the production.

Altogether, this ties customer Y very hard to ABB and thus the technical and knowledge bonds between customer Y and ABB are probably the strongest of all the bonds. CAB is also creating such knowledge bonds. Every time people from ABB and customer Y are working together, they learn about each other’s business and knowledge bonds are created.
15.6 Conclusions

These are the conclusions drawn for Case two, divided into general conclusions, conclusions for the systems and conclusions for how to measure the results of the CAB cooperation.

15.6.1 General conclusions

The support from top-management at the customer together with the social and technological bindings seems sufficient as a foundation to build the cooperation on. On that foundation a strong cooperation can be build by carefully establishing trust and work up an understanding for the needs and benefits.

Trust and understanding were in the CAB cooperation built by working with real business issues that were important to both parts and by successfully solving these issues and thus showing real benefits. Although the benefits are not clearly proven yet in the company statistics, there is a clear belief among the participants in the CAB cooperation that they do exist.

It is also clear how important support from leaders and dedicated resources have been in this case. Before the CAB cooperation received support from top-level management, the work in the CAB group had low priority with the CAB group members, with the result that the meetings were irregular and commitment lacking.

15.6.2 Evaluating the results of the CAB cooperation

The highest prioritized area of improvement in the unit of analysis is the evaluation of the results of the CAB cooperation. It is very important to be able, with objective measures, to show the results that have been obtained in the new way of doing work, to show the participants that they are doing a good job and finally to show management, both at the customer and ABB, that it is a good way of handling key customer relations. (Kleiner & Roth, 1997)

The CAB cooperation now has come to the stage where it is a pilot that is starting to show signs of positive results. These signs are in the form of indicators of behavioral change, mainly in the form of improved cooperation between ABB and customer Y technicians. These indicators may still be the sole proof of success for the CAB cooperation. Therefore we believe that they should also be used as such, that they should be further examined and communicated as signs of a successful project. (Kleiner & Roth, 1997)

The factors that indicate behavioral change could be qualitative factors like:
• The willingness of ABB employees’ to cooperate with the people of the customer

• ABB and customer Y employees willingness to take time to work in the CAB projects

It is also possible to quantify some of the measures, although this should be done with caution and perspective, like:

• Number of CAB projects running
• Number of people, at ABB and customer Y, involved in CAB projects
• Number of hours (approximately) worked in CAB projects
• Total number of “successful” CAB projects
• Percentage of all the CAB projects that are “successful”

Eventually there must be tangible results, showing in customer Y’s production statistics or somewhere else in the customer’s business. Demands for such results should and will come, although display of behavioral changes can delay them and buy more time, tangible results eventually have to be found. The tangible results must be strongly connected to the core business, like the production down time that is now measured. (Kleiner & Roth, 1997)

Other tangible measures than the one used now, downtime caused by ABB’s products, could be:

• Total number of stops in the production
• Total number of near stops in the production, things that was close to going wrong but went well

15.7 Reliability of the findings of the case

We have used the interview of the customer team and CAB leader (same person) as sole source of information for Case one. This means that there is a risk that the opinions and views of this one person influence the results of the interview. We believe that this affects the reliability of the analysis and the conclusions drawn from the analysis, but not to the same extent the analysis and conclusions drawn

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24 Some kind of criteria for success has to be established.
about the applicability of the model (see chapter “Academic conclusions from the cases”).
16 Academic conclusions from the cases

This chapter contains all the academic conclusions that were drawn from the two case studies, conclusions concerning the applicability of the Knowledge Situation Model and the Cycle of Knowledge Sharing. It also contains a summary of the experiences from applying the model and hints for the knowledge management practitioner that wants to use the model in his work.

The two case studies gave us an opportunity to test the applicability of the method and to learn how to apply it. The model and its parts proved to be of high interest, also in practical work. It was indicated that all the dimension in the Knowledge Situation Model are firmly connected to each other and that not analyzing all of them as part of the whole picture would make it hard to achieve the desired results.

It was on the other hand proven that one dimension can be in focus initially, but that all dimensions eventually have to be taken in account. This was shown in Case one where the knowledge dimension was initially in focus. First the knowledge needs were thoroughly examined. Then, when a prioritization had been made among the knowledge needs and a specific knowledge area had been chosen, the other dimensions (primarily systems and customer relation) were analyzed out of a knowledge perspective.

Several of the dimensions interact and cover similar areas. Social bonds are tightly connected to social incentives, and culture. Technological and knowledge bonds and the incentives they create are linked to the value derived, and the understanding of the benefits of knowledge sharing at the supplier and the customer respectively.

One of the most important academic conclusions is that all the factors in the people dimension, culture and frames of reference, also apply between a supplier and its customer i.e. in the customer relationship. Trust and understanding between organizations is as important for the success of inter-organizational knowledge sharing, as in the own organization for intra-organizational knowledge sharing. It is important to have trust between the supplier and the customer and also understanding of the benefits of exchanging knowledge with the customer.

16.1 Notes about how to apply the model

We have in case two arranged the analysis of the case according to the dimensions and the parts of the model. That we believe is not necessary, it would probably...
work very well with another disposition of the text. Which disposition is the best we believe is dependent of the characteristics of the case that is to be analyzed.

As stated earlier, all the parts of The Knowledge Situation Model must not be used in every analysis. This opinion has been validated in this case study. We have in Case two neglected to analyze according to the knowledge dimension. Despite this, we saw that we were able to draw useful conclusions from the other dimensions in the model.

In the incentive structure part of the Knowledge Situation Model, there are incentives that derive from leadership. There is also a section that treats the whole issue of leadership. It has proved to be most practical if the comprehensive analysis of the leadership is done under the leadership part and that the incentive part just contains a summary of what consequences the leadership has on the incentive structure.
17 Conclusions

In this chapter we present a summary of our conclusions for inter-organizational knowledge sharing.

We have concluded that the organization, people, the knowledge, the customer relation and the systems all play important roles for inter-organizational knowledge sharing between a supplier and his key customers.

**Figure 41 The Cycle of Knowledge Sharing**

17.1 The availability, applicability and transferability of knowledge determine how to share it

The availability and categorization of knowledge have great impact on knowledge sharing. The availability is about where the knowledge resides, in what form, time and location it is to be found, and the knowledge categorization is about its applicability and transferability, i.e. for whom it is valuable and how easy it is to transfer. The applicability is closely linked to the value of the knowledge. The transferability of the knowledge, ranging from tacit to explicit knowledge, determines how easy it is to transfer the knowledge. From the applicability and transferability, it is possible to draw conclusions about with what strategies to approach the management of a particular knowledge.
17.2 The organizational structure, leadership and incentives should be designed to support knowledge sharing

Modern organizational design is about weighing organizational forms against each other. The advantage of the task force, which is cross-functional and impels motivation, must be weighted against the advantages of the bureaucracy, which is precise, constant and reliable. The advantages of the action plan should also be weighted against those of the performance plan. For every task that organizations are to perform they have to decide which mix of these organizational forms that is the appropriate.

The location of decision rights is another important factor. He who makes a decision has to have access to the right knowledge to make the best decision. For knowledge sharing to be effective, there must also be dedicated resources in the form of people’s time.

Knowledge sharing is an activity that neither can be supervised nor be forced out of people, it has to be voluntary. Therefore the role of the leadership is to create and sustain a knowledge-oriented culture, probably best through a less authoritative and more democratic leadership style. For people to be motivated, they must feel they are treated fairly, that they are treated with a fair process, i.e. engagement, explanation and expectation clarity. Managers should also accept and reward creative errors and collaboration.

To motivate employees to share knowledge, management has to adapt the incentives to the situation. Leadership, monetary, status-related and social incentives can all be used to motivate knowledge sharing.

17.3 A knowledge sharing culture and compatible frames of reference are essential for success

Trust and understanding are the most important components of a knowledge sharing culture. Understanding is important to convince people to make knowledge work a priority and trust is important in order for people to trust other people to be knowledgeable and to return the service of knowledge sharing. Understanding is built through information about the benefits of knowledge sharing and trust is built through social interaction.

For people to be able to communicate and understand each other, they must have compatible frames of reference, or else there will have difficulties sharing or transferring knowledge. This can be achieved through face-to-face discussions, education, teaming and job-rotation.
17.4 The bonds of a customer relation simplify and create incentives for knowledge sharing

The bonds of a customer relation create incentives and simplify knowledge sharing. Technical, knowledge and legal bonds create incentives to share knowledge. Social bonds simplify in creating trust and understanding through social contacts. Logistical and administrative bonds simplify knowledge sharing through adapted routines, processes or systems or simply because of geographical proximity.

As a tight business relation requires knowledge sharing to prosper, and knowledge sharing requires bonds for incentives and simplicity, we conclude that inter-organizational relationships require knowledge sharing and inter-organizational knowledge sharing requires close relationships.

17.5 Media for knowledge sharing should have appropriate richness for high quality and efficient knowledge transfer

Those responsible for transferring knowledge must find appropriate ways to code and distribute knowledge. Feedback from the recipient to the origin decreases the risk of errors in the knowledge transfer. Different media have different richness, i.e. capabilities of transferring tacit knowledge. The richness of a medium depends on if feedback is possible, if different signals can be used, if natural language is possible and if it is possible to adapt the communication to the recipient.

High quality and efficient communication of knowledge is achieved when the medium has the appropriate degree of richness. For the quality of the transfer to be high, the medium must have sufficient richness in relation to the transferability of the knowledge. If the medium used is richer than necessary, on the other hand, there is a loss in the efficiency of the transfer.

A knowledge transfer system is the whole system of activities of a complete knowledge transfer, including the transfer itself and the codification that takes place at the origin and the recipient. People based systems are best for the transfer of tacit knowledge and technology based are best for the transfer of explicit knowledge.

17.6 Knowledge management is an iterative cycle

Knowledge management is a very complex issue. Planning in such circumstances is more effective as an ongoing endeavor, reflecting the changing and unfolding environments with which organizations interact. We see it as a never-ending iterative cycle of continuous improvement, going from evaluate situation and need
to focus and analyze to set goals and plan activities to improve knowledge sharing, and then back to evaluate situation and need and so on.

The Cycle of Knowledge Sharing encircles the Knowledge Situation Model. Every one of the four phases should at least to some extent consider all of the dimensions in the model, as they are strongly linked together. However, an iteration in The Cycle of Knowledge Sharing can focus on one of the dimensions in the Knowledge Situation Model, although we believe that a holistic approach, that at least to some extent considers all dimensions, increases the probability of achieving the desired results.

17.7 Quantitative and qualitative measurements are needed to evaluate the intangible values of knowledge sharing

The cost for engaging in a knowledge management initiative with a supplier or a customer must be weighted against the potential return from the cooperation. We believe that all costs that are related to acquiring specific knowledge about a customer must be compensated by profits from sales to that specific customer.

Both quantitative and qualitative measurements are needed to evaluate the effects of knowledge management. If a company relies solely on financial measurements, there is a risk of shortsighted thinking and of sub-optimization. Intangible measures should also be used. The problem with intangible values is that they are hard to measure and even harder to quantify. Therefore they should not always have to be quantified. Measuring the intangible values of knowledge management is important, first, because most values that come from knowledge management are intangible, and second, because knowledge management is a novel discipline whose benefits are still doubted.
18 Reflections

In this chapter we present our final reflections around the result of our work, how it could have been different and how we believe that further research could be done in this field.

18.1 Reliability and validity of the results

In this section we discuss the reliability of the results and in which situations the results are likely to be valid.

18.1.1 Validity

Validity involves how well the theoretical concept corresponds to the operational concept (Aronsson, 1975). We wanted to create a model to support the improvement of knowledge sharing in a key-customer relationship. Is our theoretically generated model suitable for practical knowledge management? We believe, since we have successfully used it to analyze two key-customer relationships supported by customer teams, that to be the case.

The next validity question is whether the methodology can be used elsewhere, and to what extent. We have put together a model general enough to be applied in any key-customer relationship and, as the sources are not ABB specific, we believe that the methods is applicable elsewhere.

One aspect that is not taken into account is the differences in national cultures that can affect knowledge sharing between companies in different countries. This affects the validity of our results for he who wants to apply our model in such a context.

18.1.2 Reliability

We have a large number of literate sources to back our conclusions. We have also been careful and have chosen what we together with our tutors see as high quality sources. Quality and not quantity have been our primary goal. Nevertheless, we have aimed at having several sources backing every dimension and major conclusion. The reliability of the Knowledge Situation Model is based on those sources.
In the two case studies, we have tested the applicability of The Knowledge Situation Model and The Cycle of Knowledge Sharing. In Case one, we focused the analysis on knowledge, and left out some other dimensions of the Knowledge Situation Model. In Case two we produced a more thorough analysis, covering more dimensions, but did not analyze the knowledge in the exchange. In case one we covered three out of four phases of The Cycle of Knowledge Sharing and in Case two just the first two phases of the cycle. What does this tell us about the applicability of the model?

We have performed analyses of all four dimensions, but not at the same time, with focus on all dimensions, but are thereby convinced that the Knowledge Situation Model is suitable and applicable for analyses.

“In the best of worlds” it would have been preferable to perform all activities and analyze all dimensions in more than one cycle of The Cycle of Knowledge Sharing to be able to come to hard conclusions about the usefulness and importance of the different analysis tools. This was unfortunately not possible in our short time frame.

Two cases are not very many for a scientific conformation of the applicability of the methodology. We have used the methodology, but to evaluate the effectiveness would require a different study, which we do not perform in this master’s thesis.

However, what we have done when analyzing the situations in the two cases, is to focus on the dimensions which we thought most appropriate for an analysis, which have led to the desired result. We believe that this is a highly realistic way of applying the model and stimulating knowledge sharing.

18.2 How our view of knowledge have affected our results

Our view of knowledge is that it originates and resides in people’s minds. A more “social” view of knowledge is that knowledge is knowledge only if at least one other person agrees on the definition and content of the knowledge. Would our conclusions have been different if we would have used a more “social” view of knowledge?

Yes and no. The dimensions in the Knowledge Situation Model would probably remain the same, but more stress would be put on the objectivity of knowledge and the importance of feedback and quality of knowledge.
18.3 Possible further research

We have in our research stressed the importance of measuring the intangible values that come from knowledge management, but practical best practices of measuring the effectiveness of knowledge management initiatives are still hard to find. Further research around different ways of measuring the effect of knowledge management and the effects of these measurements is an interesting field for further research. How to measure cultural and behavioral changes effectively is much left unexplored and is therefore an interesting more specified topic for research.

We have in our study not evaluated international differences in behavior and how they affect e.g. the building of a knowledge sharing culture. This can be highly interesting for multinational knowledge management over cultural borders, and is therefore an interesting topic for further research.

18.4 A last comment for the road…

As a last comment to the phenomena of knowledge management we would like to quote a well-known person that is often perceived being very knowledgeable.

"Imagination is more important than knowledge..."

Albert Einstein
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Appendices
Appendix A, Analysis checklist

This is a checklist to use when analyzing according to the Knowledge Situation Model.

The Systems Dimension

Questions to answer

- People based systems - are systems that use a people-based medium for the knowledge transfer.
- People based media - are different kinds of face-to-face meetings and meeting routines.
- Technology based systems - are systems that do not use a people-based medium for the knowledge transfer.
- Usage in technology based systems - are the systems used, how frequently and by how many?
- Knowledge transfer - media richness / knowledge transferability.
- Levels of knowledge sharing - origin (one/many) and recipient (one/many).

Tools

- Media richness scale
- Matrix for mapping of knowledge transfer systems (see Case two)

The Organization Dimension

Questions to answer

Structure

- Planning and control systems - performance control / action planning.
- Knowledge and decision rights?
- Dedicated time?

Leadership
Leadership style - authoritative / democratic

Coordination - control / standardized results or common goals and visions.

Leadership - and its attitude towards Knowledge Management.

Leaders - are they champions that promote change (in culture) and help teams withstand outside distractions?

Impediments - people provide their best work under pressure; people should perform all work without wasting time getting to know each other; managers and specialists knows what has to be done, others don’t need to bother; display of intolerance for mistakes or need for help from leaders.

Leaders - as facilitators for a culture of trust, understanding and altruism

Fair process - Engagement, Explanation and Expectation.

Incentives structure

Social incentives - are individuals’ wants to meet the needs of the group to which he belongs, enhanced by positive encouragement or feedback from the same. This to gain appreciation in the group and achieve a higher status in the same.

Leadership incentives - leaders creating incentives by showing commitment and “leading the way.”

Monetary incentives - are monetary rewards for knowledge sharing, like gifts, bonuses or higher salary.

Status related incentives - are e.g. honor, promotion, more responsibility or more important or interesting work.

Do the incentives fit the situation?

The People Dimension

Questions to answer

Culture

Good culture - of trust, understanding and altruism?

Trust - do people trust each other to exchange knowledge, trust others to be knowledgeable?
- **Understanding** - Does people that are supposed to share knowledge, understand the benefits of sharing knowledge and why they are supposed to take of their time to do it?

- **Altruism** - are people in possession of the knowledge willing to share knowledge and information with colleagues without expecting compensations?

- **Bad attitudes** - “it's not my job,” “not invented here” or “knowledge is power”

- Do people sharing their knowledge feel that it is worth the time they invest in the sharing?

- Is there a culture of teamwork with compensations and rewards that support it?

- Are people or groups of people hoarding knowledge for personal gain or political reasons?

- **Knowledge hoarding** - it’s bad if knowledge differences among employees is the source of authority or power

- Is the company evaluating performance and providing incentives based on knowledge sharing?

- Do people have compatible frames of reference?

**The Knowledge Dimension**

**Questions to answer**

- **Availability** - form, time and location

- **Applicability** - specific / general

- **Transferability** - explicit / tacit

- **Applicability & Transferability** - one-off, complex, quick access and broad-based knowledge.

**The Customer Relation Dimension**

**Questions to answer**

- **Social Bonds** are personal relationships between the decision-makers in the participating firms, which are important for mutual trust.
- **Legal and Economic Bonds** are agreements and treaties, which tightens the partnership.

- **Logistical and Administrative Bonds** come from coordination, routines or geographical or structural adaptations.

- **Technical Bonds** are e.g. adaptations in products and production resources and machinery or adaptations of technical resources. **Knowledge Bonds** are bonds of Knowledge developed from the relationship.
Appendix B, Business and Knowledge needs of the Case one unit of analysis

Business Needs

Customer X’s business need

The case study customer is a typical process industry, which means that operational development is highly focused on increased productivity. Increased productivity is achieved by increasing the degree of utilization and the capacity on the machines and thus lowering the cost per tons of paper.

In the paper industry it is also very important that the product quality is very high and even. A high product quality is something the customers’ demand, defects are simply not accepted and they make the product impossible to sell.

ABB’s business need

Help the case customer by adding value in his business and thus become a prioritized vendor. This should be achieved by; working proactively to help the customer improve his business, provide products better aligned with the customer's needs, knowing the customer's business and adjust the way ABB works thereafter.

The customer team’s business need

The business need, or actually the purpose of the customer team is to improve the cooperation between ABB companies selling to the specific customer and also between ABB as a corporation and the specific customer. This is to be achieved by transferring information and knowledge, and building informal networks.

Knowledge Needs

Knowledge needs of the customer team

Knowledge about the key-people at the customer and the ABB companies and their respective knowledge

Knowledge about the case customer’s opinions about ABB, the delivered product and service

Knowledge about those at ABB interested in different knowledge or information

Knowledge about the plans for investments that the customer has for the mill
Knowledge about the different ABB companies respective strengths and ambitions (what they can offer the customer)

Knowledge about delivering and delivering problems

**Knowledge Needs of the Customer**

Knowledge about bugs and defects on ABB’s products, the effect of those bugs and how to prevent them

Knowledge about the key-people at the ABB companies and their respective knowledge

Knowledge about processes and process development, which ABB has acquired in working together with other customers

Knowledge about ideas and visions of different ABB companies as regards products and product development

**Knowledge Needs of the ABB companies**

Knowledge about bugs and defects on ABB’s products, the effect of those bugs and how to prevent them

Knowledge about similar projects within ABB

Knowledge about the key-people at the ABB companies and the customer, and their respective knowledge, their different competencies and their respective “experts”

Knowledge about processes and process development, which ABB has acquired in working together with other customers

Knowledge about different ABB companies product development and coming products
Appendix C, List of solution suggestions for Case One

Knowledge about Bugs and defects

This is a suggestion to create a channel for the exchange of knowledge about bugs and defects between the engineers at ABB and the technicians at the customer. The information should be accessible for other customers, the customer team, the ABB service function and other entities in need of the knowledge.

The channel would be based on a database, and with each entry in the database, a name should be connected so that contact could be established for further meetings or explanations.

Engineering Apprenticeship

ABB engineers spend 1-5 days with the customer to discuss products and learn the customer’s needs and preferences. The engineers’ experiences are later documented and communicated within ABB.

Key People Database

The suggestion is a key people database containing information about key-people for each entity. Examples could be members in the customer team, managers and influential technicians. The information should include for instance competencies/experiences, aspirations and contacts.

Only the customer team should have access to the information about the personnel at the customer, so that contacts with the customer go through the customer team.

Yellow Pages

The suggestion is a database with information about knowledgeable people on specific subjects. A limited number of people at ABB and the customer should have access to the information to prevent misuse.

Information could include present and previous projects, competencies or aspirations.

Only the customer team has access to the information about the personnel at the customer, so that contacts go through the customer team.
Project Best Practice

The suggestion is only ABB internal. It suggests a database with descriptions of projects carried out by different ABB companies. It would include information about the project’s characteristics, technologies involved, things that went right, and why, things that went wrong, and why and contact people.

It should be accessible for all project managers and related personnel at ABB. The project database should provide a place to start and a place to look for people to talk to.

Full-time Customer Team Leader

In order to avoid mixed loyalties, between the product company and the customer team, for the customer team leader, we suggest full-time customer team leaders. This would also avoid the insufficient knowledge transfer between customer teams that we have met today. With the suggestion the customer team leader could focus on the team leader work.
Appendix D Maximum list of Knowledge Areas (in Swedish)

Fältet ”jag vet” betyder att respondenten besitter kunskapen

Fältet ”vikt” fylls i med en siffra för att ange hur viktigt det är för respondenten att besitta kunskapen

1 helt oviktigt – oväsentligt för mitt arbete

2 intressant – intressant men ej direkt kopplat till mitt arbete

3 önskvärt – ej nödvändigt för att utföra mitt arbete, men skulle kunna underlätta/förbättra

4 nödvändigt för mitt arbete

Fältet ”vem vet” fylls i med ett namn för att antyda var kunskapen finns i eller utom organisationen och i viss mån hur spridd kunskapen är.
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<td>Vem vill veta vad hos CUSTOMER X?</td>
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<td>Hur är inköpsfunktionen på Customer X utformad och varför?</td>
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<td>Inköpschef</td>
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<td>Förhandlingsfrihet för inköparna</td>
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<td>Ramavtal – med vilka och till vilket syfte</td>
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<td>Åsikter om ABB och dess produkter</td>
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<td>Nya produkter och produkter på gång</td>
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<th>Kunskaper om …</th>
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**Kundteamet**

Möten och rutiner

Kundteamets roll, syfte och nytta

**ABB:s säljfunktion**

Hur är säljfunktionen på resp. ABB-bolag organiserad och varför?

Organisation

Historisk försäljning + försäljningstendens

Vilken uppdelning av marknaden mellan säljarna används?

Förhandlings frihet för säljarna

Vilka strategier finns för området? Varför?

Hur fungerar marknadsföringsfunktionen på ABB? Varför?

Hur ser ABB:s marknadssituation ut?

Marknadsandelar, hos CUSTOMER X och i branschen

Kundsammansättning, tendens?

Konkurrensfördelar och -nackdelar gentemot konkurrenterna.

Strategiska partnerskap och meningen bakom dessa partnerskap.

Vilka marknadsföringsstrategier har ABB? Varför?
### Vem är vem? / Nyckelpersoner

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