Knowledge transfer in enterprise resource planning (ERP) projects

Towards a framework for increased learning when implementing ERP Systems

Erik Nilsson
Abstract

Companies spend considerable amounts of money on implementation of enterprise resource planning (ERP) systems. The implementation of an ERP system is risky since it involves the core administrative processes used to give a good customer service, plan and monitor production, handle suppliers and monitor the financial effectiveness of the company. It is quite clear that a wrongly managed ERP implementation can cause lower customer satisfaction and weakening trust from the market. These are effects that companies can’t afford in most markets were competition is very strong and customer service is the key to future improved business. One very important part to minimize the risk in such projects is to focus on change management and knowledge transfer to the end users. The end users need to be equipped with the right knowledge in the new ERP system from day one, otherwise the risks grow considerable. Missing knowledge can cost missed deliveries, customer complaints, financial claims and most importantly lower compatibility on the market. This thesis builds a framework with main points to consider when building a positive learning environment and how to break the information wall so that the trainer can get through with the message.

Key words: ERP System, Cognitive theory, Change management, Learning
Executive summary

ERP (Enterprise Resource Planning) systems are implemented in most of the large enterprises in the world. An ERP system assists enterprises in automating and integrating corporate cross-functions such as inventory control, procurement, distribution, finance, and project management, etc. ERP systems have a number of packaged, predefined processes that are delivered with the system. These processes can to some extent be tailored to the specific needs that different companies have. To change the processes further than the ERP system supports is often very costly and is also working against the benefits of buying an ERP system. Instead the organisations need to adopt their processes to fit the ERP system and the people in the organisation have to adapt to a changing working environment. The challenge is to make the people in the organisation adapt to the new processes that the ERP system supports and to make them productive from day one. An extra effort must be spent on the knowledge transfer process in order to avoid as much disruptions to the business as possible.

The purpose of this thesis is to study the factors that need to be considered when transferring the knowledge about the processes in a new ERP system to the end users. The management demands a smooth transition to the new ERP system so that customers don’t get hit by missed delivery deadlines and without a declining customer service. Theories regarding ERP implementations, change management and cognitive psychology are combined to build a framework for knowledge transfer when implementing ERP systems.

With over 12 years as a consultant implementing ERP systems I have experienced how hard it is to train the end users. Some users have it very easy to understand and relate new terms and processes to their current way of working. Some other users don’t have this ability, and the company will lose momentum by not having a work force that is up to speed with the new process. People’s cognitive ability differs, and it is necessary to provide a better learning experience based on their different abilities.

The theoretical framework presents two models that both influences different parts of the learning process; Building a positive learning environment and breaking the information wall.

A positive learning environment is the foundation of for any successful knowledge transfer. Correct communication between management and employees, between the project and the end users, between the end user participating in the project and those who are not, are very important. By letting people know what is happening in the project it creates a good learning environment, which has been shown to be very important. The response from the employees interviewed showed that they who where involved in the project where more positive to the change, compared to those who didn’t get as much information. The negative attitude towards the project affected their interest in learning and affected their capabilities to understand the new processes.
To decrease the problem of communication it is important to use a common language and to increase the user’s ability to relate to the information, this leads to breaking the information wall between the trainer and the student. The theory, and confirmed by the case study, shows that it is important to stimulate users in the organisation in order to increase their ability learn. By triggering small tasks in the organisation it is possible to increase the absorptive capacity, which will give a better result of the trainings. A common language need to be established so that trainer and end user understand the terminology and can relate it to their own processes. End users are used to their own terminology often related to their business or their previous ERP or IT system, while the consultants of the ERP experts are often stuck with the terminology of the system. It is hard break away from old expressions but it is necessary to establish a common vocabulary that is used during the project and the trainings. By decreasing the semantic complexity it will be easier for the student to understand and make sense of the information that the trainer is trying to convey.

The findings in this thesis should give enough motivation to any ERP implementation project to focus greatly on the change management and the training during the implementation. An ERP project is a great deal more that finding solutions to technical problems. It is a change that effects the employees in the organisation and this change need to be managed in a proper way. I suggest that one role in an ERP project should be responsible for coordination of the change management related activities. This role should have the responsibility to manage the way the change is brought to the organisation.
Acknowledgements

This thesis should have been written 12 years ago when I did my fourth year at the University of Växjö. A new job came in between and I never made the extra effort to write the thesis at that time. Since then I have been thinking about the unfinished part of my university career and always had a bad feeling of this missing part. I am glad that I brought this up with my manager at my current employment and that he put pressure on me to write this thesis. I am very grateful to Hartmut Frantz because of that. I would also like to thank my wife who did all the proof reading and gave me much support during this process.

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1 Introduction

Businesses all over the world are trying to leverage their IT investments in the best way. Information systems (IS) should provide all the necessary functions and information to the business and at the same time it should be cost effective. One type of information system is the ERP (Enterprise Resource Planning) systems that are implemented in most of the large enterprises in the world (Klaus, Rosemann & Gabel 2000). An ERP system assists enterprises in automating and integrating corporate cross-functions such as inventory control, procurement, distribution, finance, and project management (Tarn, Yen & Beaumont 2002). ERP systems have a number of packaged, predefined processes that are delivered with the system. These processes can to some extent be tailored to the specific needs that different companies have. To change the processes further than the ERP system supports is often very costly and is also working against the benefits of buying an ERP systems. Instead the organisations need to adopt their processes to fit the ERP system and the people in the organisation have to adapt to a change in their working environment (Tarn, Yen & Beaumont 2002).

It becomes a very delicate balance between the cost of IS investments and the benefits it gives to the receiving organisation (Tarn, Yen & Beaumont 2002). The way that the ERP system is implemented becomes crucial for how the organisation will benefit from it. It is natural that the persons affected by the changed ERP system are resistant to the change (Mento, Jones & Dirndorfer 2002). The challenge is to make the people in the organisation adapt to the new processes that the ERP system supports and to make them productive from day one (Soja 2006). An extra effort must be spent on the knowledge transfer process in order to avoid as much disruptions to the business as possible (Wang et al 2007).

As said before, implementation of a new ERP system will require the employees in the organisation to adopt their working process to the new system. Any employer in Sweden is required by the Swedish Work Environment Act to make sure that the work environment is designed in such a way that the employee is not subjected to physical or mental strains that can lead to ill-health(AML chapter 2:1). To put in place a new ERP system that, for some employees, is their only tool requires considerations to the changes in working environment. By informing and providing appropriate training to the employees, the risks of subjecting them to stress is reduced. It is therefore not only a business matter to work with the training and the change management when implementing ERP systems, it also in some way required by law to make sure that the employees are trained. Furthermore the Work Environment Act says that;

“The employee shall be given the opportunity of participating in the design of his own working situation and in processes of change and development affecting his own work” (AML Chapter 2:1)
The employee is therefore required to involve the personal in the changes to prepare them for the change and allowing them to participate in the design of their working processes. I would say that it gives an extra weight to the role of change management and end user training in ERP projects.

Current research exists in the areas of ERP implementation (Shtub 1999, Soh & Sia 2004, Scott 2005, Soja 2006, King and Burges 2006), change management (Fugate, Kinicki & Prussia 2008, Fedor, Caldwell & Herold 2006, Mento, Jones & Dirndorfer 2002) and cognitive psychology (Shuell 2001, Checkland & Holwell 1998, Wang et al 2007). These are of course very wide areas and there are a lot more references available than the listings above. At the moment there is no available research that combines knowledge from these different areas to show how the knowledge transfer process should be handled in ERP projects. I hope that in the future we will see more research done in this area and that the contribution that this thesis gives can be a starting point.

1.1 Purpose

The purpose of this thesis is to study the factors that need to be considered when transferring the knowledge about the processes in a new ERP system to the end users. The management demands a smooth transition to the new ERP system so that customers don’t get hit by missed delivery deadlines and without a declining customer service. This paper seeks to define a theoretical framework for knowledge transfer in ERP projects. Hopefully future research can follow this thesis and extend this framework to a methodology that can be applied in ERP projects to enhance the knowledge transfer process.

1.2 Knowledge transfer framework

To be able to get a deeper understanding of the subject I will make a journey through current research within three different fields that will build a framework for evaluation of the knowledge transfer process in one ERP implementation project. The first field is general research regarding ERP Implementations, mainly to get an understanding of what current research says about the methods to successfully implement ERP systems. Next, it is important to study aspects of change management, mainly related to knowledge transfer to the end users in the organisation. And finally cognitive theory will be studied to get the knowledge on the current learning theories and research done. These three fields will then be combined to build a framework for knowledge transfer in ERP projects.

1.2.1 Own experience

I have worked 12 years with IT and implementation of various types of information systems. The last 10 years I have specialised in ERP (Enterprise Resource Planning) systems and implementation of mainly logistics processes but also been involved in implementation in manufacturing, finance and industry specific solutions for the utility
industry (energy, gas, water etc). I have worked as a consultant in about 10 different implementations and experienced the difficulties it can be for people in the organisations to adapt to the new processes, which are in a way imposed by the new system.

The knowledge that the consultants or the ERP experts in the company possess needs to be transferred to the users. The means for this knowledge transfer is normally hands on training in the system. My experience is that it is very different how users can understand this type of trainings. Some users have it very easy to understand and relate new terms and processes to their current way of working. Some other users don’t have this ability, and the company will lose momentum by not having a work force that is up to speed with the new process. In other words my view is that people’s cognitive ability differs, and it is necessary to provide a better learning experience based on their different abilities. My aim is to get a deeper understanding of the factors that influence the ability of people to adapt to the new processes in to suggest a way to bridge the gap between consultants and the users.

1.2.2 ERP implementation

Many factors influence the implementation of ERP systems. For large enterprises the most important factors were Pre-implementation analysis, financial budget and top management involvement. For small implementations; implementation experience and project management is the most important things (Soja 2006).

Another problem with the implementation of ERP system is the risk of misalignment between the ERP system and the organisation. The ERP system provides basic structures that are embedded in the system and these need to reflect the structures in the organization (Soh & Sia 2004).

Scott (2005) found that end user training is one of the top reasons for failing with the implementation of an ERP system. As many as 75% of the respondents in his study reported that the next time they would spend more time on training and would tailor it more around their own business processes. Providing training too early or too late in the project, combined with the lack of tailoring compromises training effectiveness.

1.2.3 Change management

The emotion highly influences the way that the employees are able to cope with organisational changes. Positive emotions give a higher degree of coping among the employees, and the other way around, negative emotions influence the coping negatively. This would mean that if the organisation can positively influence employee’s emotions in regards to an organisational change it would be possible to get a higher degree of coping which will affect the change positively (Fugate, Kinicki & Prussia 2008).
Each person will have their own frame of reference that will effect how resistant or open they are to the change taking place. Especially in the communication of the change it is important to look at the audience. People in the management team and the people affected by the change normally require a very different communication, which is reflected in their frame or reference. To open a dialog with the people most affected by the change can give important insight in their frame of reference and therefore make it possible to influence their acceptance towards the change (Mento, Jones & Dirmdorfer 2002).

1.2.4 Cognitive psychology

Cognitive theories emphasise the acquisition of knowledge and the mental process rather than behaviour. Highly organised knowledge structures, rather than isolated facts, are seen as the outcome of learning. The focus is on understanding, problem solving and conceptual change rather than memorisation (Shuell 2001).

Traditional theories of learning view it as a stimulus-response framework. Basically it could be explained with a learner that responds to a stimulus in the environment, depending on what happens next (the occurrence of reinforcement or punishment), the probability that the learner will make the same response in the future either increases or decreases. These traditional theories focused on behavioural tasks rather than on adding components to the learner’s cognitive structure. It is important to know that though these traditional theories didn’t explain how individual come to understand complex ideas they provide a good understanding of why humans responds the way they do to a variety of stimuli and situations (Shuell 2001).

Knowledge about and ERP system must flow from those implementing the system to those responsible once in production. A fundamental component is that the learner has the capacity to receive the information from the knowledge holder. This capacity is called absorptive capacity. The learner’s absorptive capacity is dependent on prior knowledge and experience within the particular field. It means that the organisations implementing ERP systems should build up their internal knowledge within the field in order to stimulate the knowledge flow during the project time line. Companies with greater internal knowledge will have a more successful ERP implementation (Wang et al 2007).

1.3 Limitations

This thesis will focus on the knowledge transfer when implementing ERP systems. It is possible that the framework for knowledge transfer discovered in this thesis can be applied to other training situation but this will not be further elaborated or investigated in this paper. The focus will be on defining a theoretical framework for knowledge transfer and then to evaluate the knowledge transfer in one ERP project, based on this framework. This thesis will not attempt to build a full knowledge transfer methodology; it will be left to coming researchers and will be a natural next step.
The theoretical framework will be built on the study of three areas where a lot of independent research has been done. Especially the areas of change management and cognitive psychology are areas where the research is extensive. I will not intend to write a comprehensive outline of these areas instead I will limit my theoretical study to really focus on aspects in these areas that relate to my problem area. Concerning change management I will focus on the knowledge transfer part of change management and leave out aspects related to the project management and organisations of such projects. When studying cognitive psychology I will mainly focus on the parts describing what influences a good ability to abstract knowledge and what requirements are involved here. The study of ERP system implementations will be focused on the change management side of an implementation. I will not for example study requirement and process design which is large parts of any ERP implementation.

1.4 Target group

This report is written for both the academic society and for business who are implementing ERP solutions. It could also be of interest to persons who wants to gain knowledge in change management and particularly the knowledge transfer process.
2 Own experience

I have worked with implementation of ERP systems, for more than 10 years. During the first 6 years I worked as an external consultant, working with different clients in both Sweden and in other parts of Europe. I worked with ERP implementation in manufacturing, medical and utility companies (electricity and gas suppliers). My current employment is within a manufacturing company working with the implementation and rollout of our ERP system.

In this chapter I will explain my experiences of implementing ERP systems, especially focusing on the aspects related to change management, knowledge transfer, user satisfaction and productivity.

The ERP system that I have experience with is provided by a German company called SAP. I describe it more in detail in the case study chapter. Briefly you could say that SAP provides functionality for most of the administrative tasks need in a company such as Finance, Sales, Production, Logistics and Human resource.

2.1 Process fit

To my experience the most challenging part of any ERP system implementation is to match the processes provided by the system with the processes in the company. The ERP system provides packaged standard processes to handle certain tasks. These standard processes can be customized to some degree but making larger modifications requires a lot of effort and considerable resources. The benefits from choosing a standard system is largely lost if you spend additional time and money to tailor the functions more than the possibilities provided by the standards in the system. The last part to make the processes fit always require the company to adjust, compromise and change their way of working.

My experience is that you will need very skilled experts in the system, and also experts in the business processes that you are implementing. To customize the processes you need to discuss best practice together with the business you are working with. An experienced consultant within those processes would have implemented the processes in many different companies and can bring suggestions about adoptions of the processes that can be very important for a successful project. When implementing ERP systems it is always important to have resources that can relate the possibilities provided by the system with the requirement from the business.

As I said earlier an ERP system implementation always demands the business to adopt their processes to some extent. This change need to be managed in a good way to be able to successfully bring the new system into the organisation. A gap will exist between
the current process and the new process. This gap need to be bridged in some way and normally this is done with different types of training and communication.

Another very important factor to make a successful implementation is that the business is available and provides the right resources to the project. Implementing a new ERP system is time consuming not only for the system experts but also for representatives from the business. My experience is that the best results are achieved when correct resources from the business have a clear responsibility in the project. They need to have time allocated for project work and be relieved from their normal tasks otherwise their focus will be lost.

2.2 Change management and training

Change management for me is to fill the gap between the knowledge that the organisation has at the start of the project with the required knowledge they need at the end of the project. During the implementation, processes can change, new tasks might need to be added and others might be removed. All the changes need to be communicated to the people of the business so that they can continue to effectively run their business. Failing to bridge this gap can be very, very costly. Causing lost customers, poor quality, delayed deliveries etc.

My best experience with change management comes from the projects where the management has a clear strategy and focus on it. These projects had a parallel stream that controlled that the change management related activities where executed. The change management stream doesn’t necessarily need to have many resources. Their task is to make sure that each part of the implementation project delivers their own change management related activities. They should decide how the communication with the end users is done in the best way for a successful project.

For me it is quite clear that the prior experience of the consultants will have a great affect on the way they can transfer their knowledge. My own experience of knowledge transfer in training sessions is that it is much easier for me to be able to convey the message to the participants if I can relate system process to a real world scenario. To be able to do this you need experience. My experience is also that the task of running training sessions is one of the first tasks that the fresh consultants get in the project. This might have bad consequences, since these consultants rarely have the ability to connect system process with the business processes. In stead, the experienced consultants should be part of these training sessions in order to guarantee a high quality of the training.

Another key to a successful project is motivated staff and management. I have experienced projects where the employees have been very reluctant to participate in the project. It makes it very hard to discuss the changes required and to find good solutions to
problems. The implementation of an ERP system requires the management to motivate their employees to make that extra effort required for a successful project.

2.3 Communication problems

When I myself run implementation projects I try to have regular information meetings with the affected people (not only the project team with key users) to make it possible for me to get a feel of how they are receiving the change. It often gives very important feedback to how we are designing the solution. These meetings are normally quite tough since most people who are affected by the change but not directly involved in the project are resistant to it. But it must be said that the reward is important and that this dialog has been started early in the project becomes very important at the point of go-live (a term used to describe the first days with the new system). At that stage, it is important that most of the people had the possibility to raise any concerns. Otherwise, it is very easy that they act uninvolved and don’t participate in the hard work that the first weeks with a new system demands from everyone.

I recall a discussion I had during a meeting with the warehouse personal in one of the implementations. I was going to present the warehouse picking process that we implemented in the ERP system. I showed the screen with the picking task, which shows the material to be picked, some information about it (like alternative material number and description) and the quantity together with the unit of measure PAL. PAL is the short form for pallet and should make the user pick a full pallet of the material.

The warehouse people immediately objected. “This type of material is not stored in Pallets, it is impossible to complete the task you are showing on the screen”.

Yes, they were right and wrong at the same time. In their terminology this type of materials are not stored on pallets. I should of course have explained to them earlier that the system can’t make a distinction between what they call Pallet and what they call the carrier of this material. In their context, the information was wrong on the screen. They needed of course to have additional information to understand the meaning of the unit of measure PAL as any type of pallet.

It always strikes me how easy it is to go on communicating using the terminology of the system without first explaining the meaning and relating it to the business that we are working in. I have experiences this many times and it is one of the very important things when designing knowledge transfer process.

2.4 Building a strong project team

Having a strong team of system experts is of course a key to a successful project. When implementing ERP systems it is especially important that the system experts not only
have a strong knowledge in the system process and the customizing of the system. You must have experience in the business processes to be able to discuss the different during the implementation. A skilled system expert can direct the business in the right way when you have to make hard decisions during the implementation.

The project team don’t only consist of system experts and project managers etc. It also consists of the representatives from the business that have been assigned to work closely with the project. These people need to have the right skills and especially they need to have the ability to discuss their business processes and relating them to the functions that the system experts describe. This is not a simple task and to my experience it is very easy to choose the wrong persons to these very important positions. The selected persons also need to get time allocated to the project. I have often experienced that they have to continue with the normal tasks and therefore can’t be available to the project enough. This can cause the project to stand still or that the wrong decisions are made by the system experts.

The project team also consists of the management of the business, who should support the project and motive the implementation of the new ERP system. They need to be convinced that the ERP implementation can be implemented in the best possible way to support their business. The management need to motivate their employees, who are often negative to the change that the implementation of a new ERP system will bring to their working environment. Many of the employees in these organisations perform most of their tasks using the ERP systems and the uncertainty can affect them in a negative way, causing for example stress. A strong management can minimize these effects and increase the support for the implementation.

By having the right people in the three groups above makes it easier to succeed with the project. To be a strong team creates a positive atmosphere and will add confidence to both the individual team members and also to the employees that will be affected by the implementation.
3 Research Method

This chapter will discuss the methodological standpoint taken in this thesis.

3.1 Own Experience

I have worked with implementation of ERP systems for 10 years. The implementations have been both large changing the ERP systems for a whole plant and smaller with implementations affecting only special departments. My experience will of course be used in this paper. I will reflect on the previous research in the subject area and in this case carefully state that it is my experience that influences the conclusions that I have come to. Both the theoretical study and my experience will be used to specify the relevant questions during the empirical study.

3.2 Positivism – Realism - Constructivism

The positivism way of looking at science is that of finding facts that are without any doubt true. It should be possible to reproduce the same result infinite number of times if the same research method is used. In fact if you remove anything that you think you know, but that you actually don’t have proof of, and then you get the “hard” facts that the positivism believe in (Thurén 2007). The facts should be quantifiable and treated statistically so that general conclusions can be made. A qualitative research approach does not go well with the positivistic ideas, instead a quantitative method need to be used. The results should be analyzed statistically and then based on these facts the conclusions should be made. It is not my aim to make this type of research. Instead I am interested in the social perspective of knowledge transfer and change management. A positivistic approach, when you study empirical questions, requires some kind of hypothesis to be tested. I don’t intend to define such a hypothesis instead I expect my research to lead me further into my subject and teach me and others more about the way we can enhance the methodology used to practice change management when implementing ERP systems.

Rockmore (2005) discusses realism and constructivism views of epistemology in a very interesting way. Realism in its different forms (direct, indirect, ontological, relative, naïve etc) in some way treats the world as a mind-independent external world. There are many different types of realism and every researcher may be partially realism in their approach. All claims to know come of course down to know the real or in any case to try to know the real. Direct realism or naïve realism claims that; the real is itself empirical, and the empirical real can be directly grasped. To elaborate on this it would be possible for me to study an organization that implemented an ERP system and get a direct understanding of the factors influencing my specific area of research. To me this seems impossible to get that type of knowledge through an empirical study. So much goes on inside people’s minds that influences the way they perceive things. As a researcher you might not be able to get
knowledge about the core points that influences a person’s perception of a new information system that basically changes their whole working environment. We instead have to try to grasp this type of knowledge bit by bit.

Rockmore (2005) describes Kant’s view of constructivism as Rockmore believes is the foundation for understanding Kant’s position. Constructivism denies that the mind can ever be brought into cognitive contact with a preexisting, mind-independent external world it does not presuppose in restricting cognitive claims to what we ourselves construct as a condition of knowing (Rockmore 2005). There are of course different degrees of constructivism. The radical constructivism believes that there is no absolute match between a knowledge and reality, this belief is mainly used in psychology and Rockmore refers to Piaget and Glasersfeld (Glaserfeld, 1995). A more moderate application of constructivism is useful in the field of information systems research, with the knowledge that a completely isomorphic relationship between real and model can not be reached. Hart (2005) explains that constructivists approach is when the research you are doing shapes the way you understand the phenomenon being researched.

3.3 Methodical standpoint

The most relevant methodical standpoint for this study is to take the view of a constructivist. My research will construct a theoretical framework that I will try out in the case study.

3.4 Research process

The research was conducted in the order shown in the Figure 1 below. The case study is a description of an ERP implementation that I was part of. The theoretical framework was defined based on the literature review and composed based on experiences from the case study and from other ERP projects that I have been part of. Interviews where then made with some of the people from the organization described in the case study in order to see how the different parts of the theoretical framework would have applied to an ERP implementation. Based on the findings in the framework and the experiences gained in the case study and from the interview the analysis and conclusions where made.
3.5 Case study

Case study as a research can be used to verify or falsify a hypothesis or to develop a theory but are best used to add to existing experience and understanding (Gomm, Hammersley & Foster 2000). Adding to existing experience is exactly the aim of this thesis. To dig deeper and to get more knowledge about what influences a good change management strategy and how to design the knowledge transfer to the different types of users of an ERP system. The empirical setting is an implementation of an ERP system were users with different type of needs can be found. My belief is that the difference between these user groups will be significant during the knowledge transfer process. The case study methodology gives me the possibility to study people participating in this organization. I will use my own reflections since I myself was part of the implementation as an expert of the ERP system, but this doesn’t mean that I at that time had the possibility to reflect on the specific questions that I ask in this thesis. I need now to go back into the organization, allowed by the case study, and ask people within the different user groups to explain how
they perceived the information that they got in the training sessions, and during information meetings etc. In the case study I will view the organization from a new standpoint in contradiction of when I saw it from an ERP expert’s point of view. My goal when implementing a system is restricted by many influencing requirements like time, money, project scope and availability of resources. With a view of a researcher I can independently analyze the implementation process without thinking of the restrictions I was phased with during the implementation. My view as a researcher is influenced by the knowledge I gained during study of current research within the field. The theoretical base will be the foundations for how I direct the case study research. As Yin (2003) states it is essential to any case study that the proper theoretical background exists to be able to design the correct case study.

The case study takes place in a logistics department with functions like customer service, supply chain planning and warehousing that went through an ERP implementation. This organization employs about 30 people, who had very different previous knowledge with IT and ERP systems. The administrative staff responsible for customer service and planning had long knowledge about another ERP system and the warehouse staff where used to operation only by paper and had limited IT knowledge.

3.6 Data collection method

I will use a qualitative research method to find out how the theoretical framework applies on a real world case. Qualitative research are those kinds of studies which are based on participant and non-participant observations, unstructured interviewing and use of non-statistical data sources for analysis (Hart 2005).

Interviews are used as the data collection method. Interviews are an obtrusive method which can generate substantial in-depth qualitative information, the researcher looks to relate individual responses hermeneutically to the big picture set by the research questions (Hart 2005). I need to find out how the people of the organization that I am researching found the implementation project in regards to the key element of the theoretical framework for knowledge transfer that I have developed. The main questions are documented in a questionnaire that will be used as the guide during the interviews. The answers are documented by taking notes.

3.7 Problems with case study method

The main critics of the case study method would argue that it is impossible to generalize based on a single case study. Compared with a quantitative research with say hundreds of answers from ideally randomly selected respondents, it seems totally impossible to call this research. Well, this is of course argued by the more positivist group of researchers, but the case study method should be used in research areas where the goal might be different. A quantitative research in my area will not give me the answers I am
looking for. I would like to get a deeper understand of how the users really interpreted the change that took place at the implementation of the new ERP system and how they interpreted the training according to their knowledge. I will add to existing knowledge and to tie different theoretical areas together. Even if I asked 1000 persons a question like “Did you understand the user training” or “Was the training enough for you to do your job” graded on a 5 grade scale it would only give me a statistical figure saying that “25 % without previous ERP experience didn’t get correct training”. I could use different statistical methods to analyze the result and would definitely get interesting findings but it would not serve my purpose of exploring the details of what is going on in the mind of these groups of people.

A case study researcher needs to be very careful not to get tempted by the option to influence the result of the research. It is valid point since the case is chosen by the researcher, the questions are designed by the researcher and the results are analyzed by the researcher. An unethical researcher could without problem influence the findings in a significant way and prove practically anything (Merriam 1988). The design of the questions that I ask the people in the organization is essential for me to get a result that I can freely analyze without it being too influenced by the knowledge and the perceptions that I bring with me into this study. Since I have been working within the studied field for many years this will be the biggest challenge. I have to leave these perceptions at the side when I describe the findings from the case study and only use this when I in the conclusion discuss the findings related to existing theory and my own experience.

3.8 Literature study

Checkland and Holwell (1998, p 22 - 23) argue that we can not research information systems without first having defined a framework of knowledge and ideas regarding the subject. They claim that this would be like writing a novel instead of doing research if an epistemological framework was not declared in advance. It would be impossible for any other researcher to be able to understand the research and be able to make up their own opinion about how believable the results are. I agree with Checkland and Holwell (1998), it would be impossible for me to get anything out of my research if I didn’t at first build an opinion about the research area before I start questioning the people which will be included in the study.

The theoretical framework will be built by studying the existing literature and combining research in different subjects. It is important to know the key parts of a good literature review, which should; exhibits technical competencies in searching for and selecting items; has clarity of expression in writing and arrangement of materials; undertakes argumentation analysis in the evaluation of existing work; and is used to structure and reasons for your proposed research and to show where your research, once completed, relates to existing knowledge (Hart 2005).
To be able to do a structure literature study I have defined key areas that I need to study in order to be able to build the theoretical framework of this thesis. These areas come from my own experience in working with ERP implementations and my interest in studying the knowledge transfer process when implementing ERP systems.

3.8.1 Key theoretical areas

My own experience has lead me to research the literature in three main areas that I believe are the cornerstones of building a framework for knowledge transfer in ERP implementations.

It is first important to find out what current research says about the methods used to implement ERP systems. I expect to find factors that can influence the outcome of an ERP implementation and how to improve the business benefits that the implementation gives. I expect to find suggestions on how to structure the projects and which parts are the key areas to focus on during an ERP implementation.

My experience is that an implementation of an ERP system requires adoptions by the business. When a new ERP system is implemented the organization has to adapt to the new ways of doing things. The second area that I need to study is what the literature says about how to manage this change. Change management and is a very broad area including not only change management during implementations of IT systems but also change management applied in other organizational changes. The current research about change management should be able to bring the organizational aspects to the theoretical framework.

I have seen that people in different organizations have a different ability to learn and to adapt to the new ERP system implemented. My question is how their ability to learn and to interpret messages can be so different and how it can be influenced in a positive way. It is therefore important to study the human ability to learn new things, which is described by cognitive psychology. I will look for theories describing the transfer of knowledge between people, and also general articles about the cognitive psychology.

3.9 Research ethics

An ethical research includes four main parts that should be considered; Design of the research; Implementation of the research; Reporting the research; Applying standards (Hart 2005).

Design of the research; the theoretical framework is built based on an extensive literature study. I have clearly defined in which areas this literature study consists of and have taken an independent standpoint from the findings.
Implementing the research; I have obtained the appropriate approval from the organization which is the case study object. Each person who took part in the interviews also gave their consent to being part in the study.

Reporting the research; I have reported exactly what I found in the case study and the interviews. The transcripts of the interviews can be found in an appendix of this paper. I have not omitted any data that I found.

Applying standards; this paper uses the Harward system to clearly show where the different theories come from.

3.10 Conclusion

Existing research within the fields of ERP implementation, change management and cognitive process will serve as the framework. These three disciplines will be combined, which means that theories from the different areas will be used to form a method or approach to dealing with knowledge transfer during change management in ERP implementations. I intend to define a knowledge transfer framework based on the theoretical study and apply this framework on an actual ERP implementation to see what could have been done differently and to see how the people interpreted the training they got. The approach I use has a constructivists view meaning that I relate to the fact that the epistemology of this subject is not isomorphic but instead that I will add to existing research. The results from theoretical study, case study and my own experience will be isolated to be able to conclude the findings.
4 Theoretical framework

This chapter will dig deep into current theories, which are relevant in order to build a framework for knowledge transfer when implementing ERP Systems. The theories examined are related to three main areas needed to be able to understand the different components of knowledge transfer and of implementation of ERP systems.

Studies regarding ERP implementation will be analysed to give an understanding of what an ERP System is and current research regarding implementation methods used. To be able to get a deeper understanding of how to successfully change and adopt the business to the new system, change management is studied. It will give a foundation for how to encourage people in the organisations to learn new processes and how this can be achieved in a positive way. But the core of this framework is how people are able to learn new things and what influences our ability to learn which is studied in cognitive psychology.

The majority of the literature referred to in this theoretical study is research articles. These where found by searching the article databases using key words such as ERP, change management, critical success factors, cognitive psychology, knowledge transfer etc. I have also got in dept knowledge about the meaning of information and implementation of information systems through the literature provided by Checkland and Holwell (1998).

4.1 ERP implementation

There are many theories regarding the best way to implement an ERP system. It is important to get a background in what an ERP system is. It is particularly important to find out what characterises a successful ERP implementation.

4.1.1 ERP system

An enterprise resource planning (ERP) system is a system that completely or partly supports the core administrative processes across the company. The ERP systems are normally standard packages with a built in support for processes like finance, manufacturing, sales, distribution and human resources (Shtub 1999). Shtub also concludes that the ERP systems with their support of masses of different processes are hard to learn how to use and that it is hard to understand how to properly adopt the processes that the system offers. Many vendors offers ERP systems, the largest being the German software company SAP AG based in Walldorf. This company delivers an extensive ERP solution and also extensions such as portal solutions, supply chain management (SCM), customer resource management (CRM), development platform etc. According to SAP themselves quote
“Currently, more than 12 million users work each day with SAP solutions. There are now 121,000 installations worldwide, more than 1,500 SAP partners, over 25 industry-specific business solutions, and more than 46,100 customers in 120 countries. SAP is the world’s third-largest independent software vendor.” SAP AG (2008).

At a fast reflection over the statement from SAP hits you that every day more people than the total Swedish population are working with this specific ERP system. Imagine now if we add the rest of the ERP vendors to this figure. It is very hard to estimate but a huge amount of people are daily managing their companies business using a standard ERP solution. It is very clear that this is a significant part of the administrative processes in the worlds companies that are managed using ERP software.

4.1.2 Problem with ERP implementations

One problem with the implementation of ERP system is the risk of misalignment between the ERP system and the organisation (Soh & Sia 2004). The ERP system provides basic structures that are embedded in the system and these need to reflect the structures in the organization. Soh & Sia (2004) says that an organisation implementing an ERP system should assess this misalignment prior to the selection of the ERP system and analyse its implication on a planned project. They found two types of misalignment; the first one is imposed misalignment, normally laws and government policies that companies have to apply to. The imposed misalignment where mostly surfaced at the ‘as-is’ or ‘to-be’ phases of the implementation, very late in the implementation. The organisation only adopted to the imposed structure misalignment in a few instances, instead the ERP system where modified to be able to handle the misalignment. The second type is voluntarily acquired misalignment, which where about management information, internal control, ease of use etc. In contrast these misalignments where to a majority managed by adoption of the organisation rather than modifying the ERP system. The implementation teams would explain the ERP process and information outputs, and propose various workarounds.

Soh & Sia (2004) found that the difficult lies in the fact that the knowledge is distributed among several groups of people. Organisational members understand the laws they have to apply to and their industrial context well and the consultants understand the ERP system. The imposed structural misalignments often go unnoticed until very late in the project due to their embedded nature gives it a ‘taken-for-granted’ quality. It is therefore important to select consultants that have knowledge about the industry and the country.

Scott (2005) found that end user training is one of the top reasons for failing with the implementation of an ERP system. As many as 75% of the respondents reported that the next time they would spend more time on training and would tailor it more around their own business processes. Providing training too early or too late in the project, combined with the lack of tailoring compromises training effectiveness. For users, learning the software is only one part of the training; relating it to their jobs is even more challenging.
Scott (2005) found a number of points that are important when writing the documentation about the ERP processes;

- Documentation should focus on organization-specific business processes
- Role-based training would provide knowledge integration and better mapping to user needs.
- FAQs (frequently asked questions) should be available online.

### 4.1.3 Critical Success Factors

The phrase critical success factors are used widely in the business by consultants and IT people to describe the key components of a successful implementation of an information system. These critical success factors are normally only a list of factors but provide little further guidance to those implementing the systems (King & Burges 2006). It is also hard to really know which factors really are the most important. Soja (2006) suggest that more research is needed to really understand what influences the factors, such as project scope, size of the project, budget and industry.

Soja (2006) did a thorough research regarding success factors in ERP implementations, which was based on the views of the participating people in the implementation. The study did not only find the success factors but where also able to see differences between success factors in large and small companies, between full scope and partial scope implementation projects.

It was found that the only considerable success factor for small business was the implementation experience of the consultants. For the large businesses this factor came last on the list of important factors. Instead, for large business, detailed schedule and top management awareness and involvement where significant success factors.

<table>
<thead>
<tr>
<th>Large</th>
<th>Small</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detailed schedule</td>
<td>Implementation experience</td>
</tr>
<tr>
<td>Top management awareness</td>
<td></td>
</tr>
<tr>
<td>System reliability</td>
<td></td>
</tr>
<tr>
<td>Implementation goals</td>
<td></td>
</tr>
</tbody>
</table>
Table 1: Success factors depending on company size (Soja 2006)

For full scope projects the most important success factors were system reliability and the project team. On the other hand for the projects with partial implementation scope it was most important with financial budget and top management support.

<table>
<thead>
<tr>
<th>Full implementation scope</th>
<th>Partial implementation scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Reliability</td>
<td>Financial Budget</td>
</tr>
<tr>
<td>Project team Empowerment</td>
<td>Top Management Support</td>
</tr>
<tr>
<td>Team composition</td>
<td>Investment plan</td>
</tr>
<tr>
<td>Linking with company strategy</td>
<td>Detailed schedule</td>
</tr>
<tr>
<td>IF infrastructure</td>
<td>Team involvement</td>
</tr>
</tbody>
</table>

Table 2: Success factors depending on scope of project (Soja 2006)

Soja (2006) concludes that the wider the implementation project, i.e. the longer its duration and the larger the enterprise, the greater influence on the project success has the definition of detailed schedule and setting the implementation goals. Also for the case of extensive projects, one has to pay special attention to the reliability of the system introduced.

King and Burges (2006) dig’s beyond the critical success factors and argues that we should explore social capital theory and social exchange theory to be able to explain:

- *Why* top management support ERP projects
- *Why* project champions promote the ERP implementation. Project champions are explained as key users or representatives from the organisations that devote their time to the ERP implementation.
- *Why* department users might support or resist the change.

Social capital is the value of the networks in the organisation, “capital is seen as a social asset by virtue of actor’s connections and access to resources in the network or group of which they are members” (Lin 2001). King and Burges (2006) uses the theory of social
capital to stress the importance of building relationship in the organisation between all the three organisational parts of an ERP implementation; top management, project champions and the department users. They mean that these organisational units must build a network that shares the same ideas to enable a successful implementation. If part of these networks gets unbalanced, there could be implications for the implementation, for example if the relationship between top manages and the departmental users are historically bad, or if the support of the project champions (person appointed by the Top management to lead the ERP implementation) have been bought by promoting them. They also add a cognitive aspect by saying that the project champions might perhaps go naïve through close and regular contact with the vendor staff and therefore get too used to the vendors language and the superiority of the new system so that they lose the close bond with the department users. The outcome of the imbalance in the relationship between the three parts of the organisation described above could lead to a high social capital in the relationship between top management and the champions, high social capital between champions and the vendors but low social capital between top management and department users and also low social capital between the project organisation and the department staff.

Social exchange theory works much alike economical exchange. Social exchange assumes that individuals take part in an exchange only when they expect their rewards from it to justify the cost of taking part in it (Gefen & Ridings 2002 see King and Burges 2006). Gefen and Ridings (2002) continue to describe an experiment that showed that when the project team responded to the end users demands rapidly and positively, the end users also provided greater support (“approval”) to the project. A positive social exchange between all the different groups will in turn deliver a higher social capital and a positive effect on the project.

I believe that we will get much more understanding of the factors influencing the success of implementation projects if we study the social capital and social exchange theories instead of studying lists of critical success factors. Good relation ship and respect between people in the organisation is necessary to be able to build a dynamic and well working organisation. It is important to motivate the different types of people that take part in an organisational change or system implementation, direct (project team) or indirect (end users), so that all feel that there will be a benefit from a positive participation.

4.2 Change management

Change management is normally used in the corporate world to group activities related to communication, training and transforming the business. It is normally a parallel track in an ERP implementation project that handles the people rather than the system. Change management is important to this study since it is change management that is responsible to create an environment that is positive and that empowers change in the organisation.
4.2.1 Creating a positive environment

Fugate, Kinicki and Prussia (2008) researched how employees are coping with changes in their organisations. They found out that a person’s emotion highly influences the way that the employees are able to cope with organisational changes. With reference to different authors Fugate, Kinicki and Prussia (2008) defines coping as the “cognitive and behavioural efforts to deal with experiences that tax or exceed the once resources”. They continue to argue that the study of coping is fundamental to understand how stress affects people. Positive emotions give a higher degree of coping among the employees, and the other way around, negative emotions influence the coping negatively. This would mean that if the organisation can positively influence employee’s emotions in regards to an organisational change it would be possible to get a higher degree of coping which will affect the change positively. Managers can learn from this according to Fugate, Kinicki and Prussia (2008), and work with communication of the organisational change in a way that reduces the concerns and which relates to things that are important to the employee’s like job security, job changes etc. Mangers should also discuss the changes in an open way and not try to hide concerns that they themselves have because of the organisational change.

Another study related to the one just discussed is investigating the effects of organisational changes on employee commitment (Fedor, Caldwell & Herold 2006). They found out that even if the change process is managed well it is not a guarantee that it will not affect the employee’s negatively and result in low commitment. Employees having to shoulder disproportionate amount of the change can result in undesirable commitment related outcomes. It will then be very important to manage the amount of change that falls on special individuals to avoid reducing their commitment. Their research shows that organisational changes that didn’t lay a great burden on the individual could often result in positive commitment.

4.3 Cognitive psychology

This chapter will focus on relevant theories regarding cognitive psychology. Shuell (2001) says that cognitive theories emphasise the acquisition of knowledge and the mental process rather than behaviour. Highly organised knowledge structures, rather than isolated facts, are seen as the outcome of learning. The focus is on understanding, problem solving and conceptual change rather than memorisation. The theories in cognitive psychology will build the heart of the framework used for analysis of the case study.
4.3.1 Overview of contemporary learning theories

Shuell (2001) explains that traditional theories of learning view it as a stimulus-response framework. Basically it could be explained with a learner that responds to a stimulus in the environment, depending on what happens next (the occurrence of reinforcement or punishment), the probability that the learner will make the same response in the future either increases or decreases. These traditional theories focused on behavioural tasks rather than on adding components to the learner’s cognitive structure. It is important to know that though these traditional theories didn’t explain how individual come to understand complex ideas they provide a good understanding of why humans responds the way they do to a variety of stimuli and situations.

Shuell (2001) gives a good understanding of the contemporary learning theories and claims that they share three main sets of beliefs:

First, meaningful learning (i.e., learning for understanding) is an active self-regulated, constructive, cumulative and goal-oriented process. The learner is active, even proactive; in their efforts to understand new things. Each learner interprets information in a unique manner based on prior knowledge, interests etc, which are used to construct a unique representation of knowledge by the learner. The constructivist theories vary considerably in regards to the influence of the mind versus the environment, private versus public knowledge, and individual versus social factors. Learning is built on an individual’s prior knowledge and experiences, which makes learning cumulative. We build new knowledge based on existing knowledge and this goes on as long as we live. In schema theory it is suggested that this prior knowledge is a complex structure that we use as a template to understand different situations. Missing information is filled in by applying a relevant schema to get the full picture. Such a schema can be positive in many situations but can also limit our ability to learn new things that conflict with an existing schema. The learner should have a goal with the learning. Inflicted goals are rejected by most theories of learning, but it is a central point of learning that the student develops and discovers their own goals.

Second, learning is dependent on the particular context it occurs. Depending on the context (i.e. where the learning is situated, who is present etc) the ability to learn is influenced. These theories suggest that learning is distributed across various individuals and tools. For example a group of ERP systems users participating in training will interpret the information in different ways. One individual in this group will never have the full understanding of the training and by discussing and analysing the training inside the group it will increase each persons understanding of the training.

Third, learning is fundamentally a social, cultural and interpersonal process. One of the most important differences between traditional and contemporary learning is the role that participation plays in learning. By integrating in a social community learning
facilitated by social interaction and language. Basically it means that a big part of our learning is practical and happens when we integrate with others.

Cognitive theories generally say that learning occurs as the result of elaboration, thinking, problem solving and reflection. It is a type of mental processing of information rather than an external reinforcement that produces learning. This is why we often get an “aha experience” some time after a training or after we heard something we didn’t quite understand. It is often necessary to experience it by ourselves before we fully understand things. Shuell (1996) suggests 12 learning functions needed to be engaged for a meaningful learning to occur:

1. establishing expectations
2. establishing motivation
3. activating prior knowledge
4. focusing attention on relevant features of the material being studied
5. encoding information
6. comparing information
7. generating hypotheses about possible relationships and solutions
8. repetition of information until it is integrated into higher-level concepts
9. receiving feedback on adequacy of one’s understanding
10. evaluation one’s hypotheses and the feedback received
11. monitoring the learning / understanding process
12. combining, integrating, and synthesizing available information to form a new revised understanding of the topic being studied

Basically, learning is very much depending on the student’s interest and eagerness to learn new things. The ability to learn can be influenced to some extent by providing a good learning environment and to provide a possibility to practice and experience the subject. I experience this very often that it is only after some time that the users of a new system can really understand what they are doing. They need to discuss and experience it before they really understand the fundamental meaning of the different system steps they perform.
4.3.2 From data to knowledge

In order for us to be able to understand knowledge transfer it is important to understand the process of transforming data to knowledge. Every day we are constantly faced with data about things in our surrounding. Data is meaningless without it being converted into information. For example, picture the following example that I myself am faced with many days.

*I go to the window where my outdoor thermometer is placed. I read the outside temperature in Celsius degrees of the thermometer and make a decision of which jacket to wear.*

This process might seem very normal and it is not common to reflect on the underlying process that is taking place. But looking deeper into it I will show that this is a fundamental transformation of data into information and knowledge. Checkland and Holwell (1998) describe this transformation in a very understandable way. They mean that data is transformed into knowledge during a four step sequence see Figure 2 below.

![Diagram: The links between data, capta, information and knowledge](Checkland & Holwell 1998, p 90)

Explaining the figure from Checkland and Holwell (1998) with the example of my morning routine on checking the thermometer to decide which jacket to wear would result in the following
DATA: The degree in Celsius on the thermometer is pure data, it doesn’t matter if I read it or not the data about the temperature is always available but it doesn’t mean anything to me until I read it.

CAPTA: If data is the starting point capta is the result of selecting some data for our attention. The number of Celsius degrees outside is only important when I pay attention to it. Checkland and Holwell notes that the mental process described as capta is so natural to us that it we don’t notice it. In fact it is so transparent to us that Checkland and Holwell had to invent the word “capta” to refer to it.

INFORMATION: Having selected and paid attention to some data we enrich it by putting it into context. The thermometer has now informed me that it is -3 Celsius degrees outside. I know what this means but to be able to make a decision on which jacket to wear I need to related it to other information and to experience.

KNOWLEDGE: The information is turned into meaningful facts when I related it to my experience and knowledge. If I know by experience that if the thermometer shows below 0 Celsius degrees I have to use the thicker jacket that I refer to as the winter jacket. The data becomes meaningful to me since I now can make some decisions based on the facts that I have discovered.

The transformation from data to knowledge is something we do in every day life. But we have to bear in mind that we do this based on knowledge that we have acquired at one point in our lives. I have been taught since I was small that if it is below 0 degrees Celsius I need to ware a proper jacketed otherwise I will freeze. In the same way we need to teach the users of any information system how to interpret the data they are faced with. They need to have the correct knowledge in order to make the right decisions based on the data that the information system presents them with. The world of ERP systems it involves getting familiar with a whole set of new terms that are used in the system to describe organisational entities in their working environment. If the meaning of these terms is not explained in the correct way it will be very hard for the user to turn data into meaningful information. Or in the worst case the user will turn the data into information based on own experience and interpret it in a way not intended by the designers of the ERP system.

4.3.3 Absorptive capacity and Knowledge transfer

Wang et al (2007) identified the knowledge transfer process as essential for a successful implementation of an ERP system. They based their study on organisational learning theory and applying these theories to the integration between the consultants (ERP experts) and the client (the users) using the bathtub metaphor (Dierickx and Cool 1998) to illustrate the flow of knowledge see Figure 3. The absorptive capacity of the client is the capacity of the bathtub and the flow of knowledge is provided by the consultant. The client
absorptive capacity is dependent on prior knowledge and experience within the particular field. It means the organisations implementing ERP systems should build up their internal knowledge within the field in order to stimulate the knowledge flow during the project timeline. According to the research of Wang et al (2007) companies with greater internal knowledge will have a more successful ERP implementation.

![Figure 3: Bathtub metaphor applied by Wang et al (2007)](image)

Wang et al (2007) also found that the consultant’s prior experience and knowledge has a very important effect on how effectively they can transfer their knowledge. Due to the high cost of customizing ERP packages, client’s processes often need to be reworked to fit the processes supported by the system. In these situations it was found that the consultant’s prior experience highly influenced on how effectively they could transfer their sophisticated knowledge about how to re-engineer the client’s processes.

Many of the end users in various operations (finance, logistics, production etc) perform the same task every day in a specific way in a specific system. It can be very hard for them to be able to suddenly learn a new way of working. In some way these people need to get prepared in order to make them more accessible to the new knowledge that they need to take in. The theory about absorptive capacity fits perfect here. In order to increase their ability to learn a new way of working their absorptive capacity need to be increased prior to the project start. The authors don’t specifically suggest a way to increase the absorptive capacity of these users. Boynton, Zmud and Jacobs (1994) did a research on how to increase the absorptive capacity regarding IT in organisations. They found that by a higher level of integration between the IT management and the line managers increased the absorptive capacity regarding IT systems and how to integrate them into the business. They say that learning is fostered by the ability of the organisation to be able to discuss problems and opportunities effectively. So basically by involving people in discussions to reflect on their working processes prior to an ERP implementation will in some way increase their absorptive capacity. They will be used to reflecting on their working processes instead of just doing them, which will make it easier for them to relate old and new processes.
4.3.4 Phenomeno-Semantic complexity

A very important part of communication between people is the actual understanding of the terms communicated. Eriksson (2007) introduces the model of phenomeno-semantic complexity. This model focuses on the process of communication between two or more sense making actors, where unpredictable behaviour emerges as a result of unintended transformation of the communication between the actors. Eriksson refers to the Ogdens triangle (Ogden and Richards 1995 see Eriksson 2007) to describe conception of meaning as structure of three components. The components are the “Idea” as the mental concept, the “Thing” as the object, which the idea is about, and the “Term” as the signal representing the idea. The “Idea” is private and only accessible by the person itself and the “Thing” and “Term” are public accessible by others. The “Term” in normal interaction between people is the words that we use to describe the mental concept that describes the object. While Ogdens triangle in itself is only valid for one person at a time (Eriksson 2007) combines two triangles to describe the communication between people see Figure 4.

![Figure 4: Relationship between two Ogdens triangles attempting to communicate (Eriksson 2007)](image)

Individual 1 is trying to communicate with Individual 2. When communicating about a thing that physically exists, both the “Term” and the “Thing” are public to both individuals. On the other hand if the thing is only a design not yet implemented, the “Thing” will only become public after it has been realized. The lack of total visibility of all the parts in the triangles for all involved parties (in this case individual 1 and individual 2) makes the complexity of the communication. Eriksson (2007) also bring in theory regarding semantic transformation that occurs when the “Idea” of individual 1 is encoded into the “Term”. The person practically puts words to the “Idea” that the person would like to convey to the other individual. On the other side for individual 2 a semantic
transformation occurs when the message is decoded into the “Idea”. The meaning of what was communicated by individual 1 has then been unintentionally interpreted in a different way by individual 2. The reason can be either formalization noise or interpretation noise. Formalization noise occurs when the sender assigns a symbol to an “Idea” while the receiver can not relate to the same symbol when he tries to understand the message. Interpretation noise occurs when the receiver assigns some type of meaning to the message that was not intended by the sender.

Semantic transformation and the distortion that can take place, when the message is formalized from idea to message by the sender and from message to idea by the receiver, are very interesting for me and for this paper. This is the point at which the misinterpretation takes place when we are trying to communicate something. The aim should be to limit the distortion of this semantic transformation maybe by building some kind of similar value base that will allow us to formalize the ideas in the same way. I am thinking mainly of building a foundation of meaning for some key objects that will be discussed during the project.

4.4 Composition of a framework

This chapter have listed a number of theories and research that will be very useful when tailoring the knowledge transfer process to the end users of the ERP system. The end users ability to grasp the functionality of their new ERP system is a key to good performance from them and as a result a successful project. Research has been reviewed in three different areas, ERP implementation, change management and cognitive psychology to build a framework for knowledge transfer. By combining lessons learned from each of these areas it will be possible to influence the user’s ability to get the knowledge they need to manage their processes effectively after implementation of a new ERP system. The focus of this section is to bring the theories together and to connect them into a framework that will be used in the case study to evaluate how the knowledge transfer process in one specific project.

The framework was composed of the findings in the theoretical study. The main influence when composing the framework was my own experience which made me look into the different theoretical areas.

4.4.1 Creation of a positive learning environment

A strong connection between the research regarding ERP implementation and change management is the need to create a positive environment. The research shows that a positive environment will affect the peoples attitudes towards the change and in its turn make them more interested to adapt to the changing processes. You might ask how this connects to the purpose of this paper, to build a knowledge transfer process in ERP implementations. Well we are talking about building the foundation for a positive learning
experience. If we are able to influence the people’s attitudes towards the implementation it will in my belief be a more positive atmosphere for knowledge transfer.

I have connected three studies and built a model (see Figure 5), which can explain how to build a positive learning environment. Later in the case study I will try this model on people who have recently experienced an ERP implementation and see how their experience fits into this model.

![Building a positive learning environment](image)

**Figure 5: Building a positive learning environment.**

The foundation is to create a good balance in the social capital between the different parts of the organisation and to motivate a positive social exchange as suggested by King and Burges (2006). Without a balance between the organisational parts of the project it will be very hard to create a positive project environment. The reward for taking part in the change of the ERP system should always justify the cost for the individual who is affected by the change. Cost being the work and efforts the users need to put into trainings, to get new knowledge and to change their ways of working and the reward being for example that their concerns are heard and what they say matter to the implementation project.

With a foundation of a balanced social capital and positive social exchange it is possible to influence the level of coping among the people in the organisation. Fugate, Kinicki and Prussia (2008) found that positive atmosphere gives positive emotions among the people involved, which lead to an increased level of coping. A higher degree of coping also influences the way that people can handle stress. By working with communication throughout the project to all the affected organisational parts, it will build a good relation ship between different parts of the organisation and increase the level of acceptance and coping from the employees.
By completing the two first levels it should already be a good environment for handling the changes but the last step is important in order to make it sustainable. Fedor, Caldwell and Herold (2006) found that even if the change process is managed well it can easily ruin the positive environment if the responsibilities for the project individuals are split in a way which is not in proportion to what they can handle. It is therefore important that in no way overload individuals with a too large portion of the change. This will in most cases influence their commitment to the project. The responsibility to handle the change should fall not on individuals but on the employees as a whole.

By managing the change in regards to these three components it should increase the possibility to build a sustainable positive learning environment.

It is now time to look at how the message is conveyed to the end users, which requires us to study theories related to cognitive psychology and learning theory.

4.4.2 Breaking the information wall

The creation of a positive learning environment and a good climate for change management must be accompanied by structured way to convey the message in an understandable way to the users. We have to bring down the information wall that can exit when someone talks about something that you don’t understand. This can happen simply by using terms that the receiver of the information is not familiar with. The data which the submitter of the information is presenting can not be transformed into knowledge by the receiver of the information. Checkland and Holwell (1998) taught us the four steps involved in transforming data to knowledge. The data and capta is kept by the submitter of information (or trainer if you like). The transformation of data and capta into first information and then knowledge is done by the receiver of information (or student). An information wall exists when the receiver for some reason can’t transform the message conveyed by the submitter into meaningful information and knowledge.
The problem on the trainer side is the way the communication is carried out. The trainer provides the data that the student should transform into information and hopefully knowledge, valuable in their everyday work. By using a terminology very common and clear to the trainer and totally alien to student the information will not get through the wall between them. On the other hand on the student side there is also a problem resulting in the student’s ability to transform the data and capta provided by the trainer into information and knowledge. To break the wall, we need to decrease the complexity in which message is submitted and to increase the ability of the student to receive the message.

The theory by Eriksson (2007) teaches us a lot about the complexity involved in communication. Ogden’s triangle showed that in communication the actors have private knowledge not known by the other party. If the trainer assumes that his private knowledge is also known by the student important information can be missed out and it will be hard for the student to turn the data into knowledge. A semantic transformation takes place when the idea of what should be communicated is transformed into the message by the trainer and when the message is transformed from a message into the idea by the student. Eriksson (2007) suggests that by carefully defining a common language there is a lower chance that the semantic transformation on each side will result in a distortion of the information. So by decreasing the semantic complexity on the trainer’s side of the wall it should be easier for the student to understand and make sense of the data.

Figure 6: Information wall limiting the transformation of information between trainer and student.

![Information Wall Diagram]

Data and Capta → Transformed → Information and Knowledge

Submitter of information (Trainer) → The information wall → Receiver of information (Student)
On the other side of the wall it is important to give the student a foundation, which makes it possible for them to transform the data provided by the trainer into information and knowledge. The student should have been given the ability to learn a new way of working before they go into the training sessions. Wang et al (2007) describes the ability to take in new information as the absorptive capacity illustrated by the bathtub metaphor. If the absorptive capacity can be increased for the students it will not cause an information overflow (illustrated by the overflowing bathtub) when they are faced with a lot of new information. Boynton, Zmud and Jaboc (1994) suggest that the absorptive capacity can be increased by allowing people to reflect on their work processes. Many people perform work processes which they do without really reflecting on why they do them. In ERP system implementations the users are already using one ERP system which is going to be replaced during the implementation. They are performing tasks that are very familiar to them but in many cases they are not aware of many of the underlying reasons for doing it in a specific way. If the user is asked to reflect on the monotonic execution of transactions to perform a specific task it makes it easier for them to be able to understand an alternative way of doing the same thing. Their absorptive capacity has been increased.
4.5 Conclusion of theoretical study

This has been a very interesting chapter to write. The research available is extensive in each of the individual areas and it was sometimes hard to find the right pieces that would contribute to my purpose of building a framework for knowledge transfer in ERP projects. I found that there are many authors that point out that training of the end users is a key part of any ERP system implementation. But I also found that we are missing the methods of how to do this. The framework that has been designed in this chapter is my way of connecting the existing research into manageable pieces that I see connected to each other in creating both and environment which encourages knowledge transfer and to direct us in the right way of performing this knowledge transfer.

In the next chapter a real ERP implementation project will be analysed using this framework.
5 Case study

This chapter presents a case study that reviews the change management process and the training efforts that were made during an ERP system implementation. The implementation project was running during 6 months from September 2007 to February 2008. I was part of the implementation process and I will describe the process used during the implementation and give special detail to the user involvement. It is important to know that when I participated in this project I didn’t have the in-dept knowledge about the factors that influence the cognitive ability of the users presented in the theory chapter of this thesis. I didn’t have the possibility to use the framework that defined in the previous chapter.

The validity of the theoretical framework where instead analysed during interviews with end users and key users in both the administration and the production. The interviews were made project in July 2008, about 6 months after the completion of the implementation. It would have given all of them some time to reflect on the implementation.

The reader might argue that it is a problem that I was myself part of the implementation and can’t critically review the implementation process and the training activities and methods used. Since I am aware of this I will first describe the implementation process in detail and give my view of the knowledge transfer activities carried out during the project.

The study will find out how the users perceived the training they got during the project life cycle and grade their readiness for the system at the point of transition from the old to the new system.

I will first give a general description of the site where the implementation took place and then describe the implementation process. Last, I will describe the result of the interviews and give a summary of the findings.

5.1 Company background

The ERP implementation took place at a logistical distribution centre. It employs totally about 30 persons. Half of the staff works with managing the operation, customer service, supply planning and administrative tasks related to logistical processes in the office. The other half of the staff works in the warehouse with the physical handling of the products.

The ERP system implementation was a part of a long roll out of logistical processes which initially started year 2002. The implementation covered most of the logistical and
sales processes such as sales, shipping, warehouse handling, claims, purchasing, finance and integration to production planning.

5.2 Implementation team

The implementation was solely run by the internal IT, which is organised in an ERP competence centre specialising in SAP. The ERP competence centre employs both SAP system experts and business people with long process experience and who have gained knowledge in the system. The aim has been to join both system knowledge and company process knowledge to build a strong in-house implementation team. External system experts also exists within some areas and are contracted when the in-house experience doesn’t exist or when availability is a problem. This team has been working together during roll-outs to 7 major logistical sites spanning all of Western Europe.

My own role in this implementation team is as responsible for all warehouse related processes. A warehouse process is basically the physical execution of any movement of the goods into the warehouse, inside the warehouse or out of the warehouse. SAP provides a specific module for these types of processes.

5.3 Implementation methodology

All SAP implementations in the company follow the same project methodology. The methodology is of a waterfall model (Royce 1970) where activities follow in sequence after each other. The method has the steps which you can see in Figure 8.
Figure 8: SAP implementation methodology.

All though the method is of waterfall type it should be pointed out that start and end of the different phases are overlapping in many cases. This is especially true about the transition between TO-BE definition and Implementation continuing on to the Test – Training phase.

5.4 Key user

Takett uses a term called key user to identify persons who are specialists in the usage (not implementation, which is done by the IT organization) of the ERP system. These persons work in different parts of the organizations and are specialists both in the business processes in their area and in how the ERP system works in that area of the business. They are the spokes persons towards the IT organization when it comes to the ERP system and they are normally nominated by the manager in the organization. The main responsibilities of a key user include;

- Supporting colleagues when they have questions about how they should use the ERP system
- Handle requests for changes of the ERP system
- Be the contact between the IT organization and the business.
- Be involved in the first implementation of the ERP system, to discuss process set up

5.5 Organisation

The distribution centre is organised with a logistic manager and four department managers under that. Each department had nominated one key user to be their spokes person during the implementation project. Below I have described the main processes for each department as they looked before the implementation of the new ERP system. It is important to keep this in mind when we look at the result of the interviews.
5.5.1 Warehouse & Shipping department

The warehouse manager manages a department with 1 foreman planning the daily operation and 13 fork lift drivers. The warehouse is operated in two shifts working from 6 in the morning to 10 in the evening. The foreman plans the operation in the warehouse and divides the warehouse tasks to the fork lift drivers. All operation in the warehouse was executed with a manual process prior to the ERP implementation. Each warehouse worker had a tray where the foremen put the picking tasks to be done during the day. The tasks were organised in the correct order so that it would fit the arrival of the trucks. The fork lift driver took the picking list and started to look for the material. Most of the material didn’t have any specific location in the warehouse so the picking performance relied solely on the fork lift driver’s ability to remember were the goods were located. It was common that the fork lift driver had to search for the material and ask their colleagues if they know where it was located. When the material was found it was just to pick, pack and label the goods. No registration in any system was necessary. The only time the warehouse people worked with the old ERP system was when they were going to print the shipping labels. It is important to know that most of the warehouse staff had limited experience with computer system either at home or at work.

5.5.2 Customer service department

The customer service department services the sales networks with information about availability, delivery, product knowledge etc. The department has people responsible for different markets and all of them were expert users in the old ERP system. This department prepare shipments to their markets and plan the deliveries.

5.5.3 Freight and Logistical support department

The logistics department handles the direct sales to the local market and handles the preparation of shipping documents to the forwarders. This department also handles
different types of claims reported by the sales networks. This department had long experience in other ERP systems and they could be considered experts within their processes in the old system.

5.5.4 Master planning department

This department handles the planning of the incoming goods to the distribution centre. Expected demand is validated towards availability and production capacity. This department plans production in two different factories and purchases from a few more suppliers. The supply planning was done in the old ERP system together with some external tools. All users were very used to working with different types of ERP systems.

5.6 Implementation project

The implementation project was planned based on the implementation methodology used during all the other roll-out projects within the company. This methodology consists of a phases that are normally executed in a flow as the list below shows.

- Start up and planning (1st August – 20th August)
- AS-IS definition (20th August – 20th September)
- TO-BE definition (20th September – 20th October)
- Implementation (20th October – 10th January)
- Training (10th December – 20th January)
- Go-Live and support (20th January – 25th February)

I will describe the project in each of these phases and give special focus to the involvement of the key users and the end users. It is important to know that the presentation below is the presentation of the project from my view as a system expert leading the implementation of the warehouse related processes. The key users and the users view will be reflected later when the results of the interviews are presented.

5.6.1 Start up and planning (1st August – 20th August)

The project started with a planning phase where each of the responsible in the implementation team planned the implementation of their processes. The project started with a start up meeting where the project scope was presented to the management and to the key users which represented each department.
The main process was presented on a high level in this meeting and a special focus were given to the warehouse implementation since this was a part that didn’t have any previous IT support. It is important to understand that on a presentation like this one can only give a very high level overview of the processes and not get into system details.

5.6.2 AS-IS definition (20th August – 20th September)

The AS-IS definition aim is to make the implementation team familiar with the business. Even if the implementation team are internal consultants it is impossible to have knowledge about each business unit’s products and specific needs. The AS-IS definition is mainly run as a number of workshops where the participants are mainly the key users, the department managers and any one else from the business who has special knowledge in the process which will be discussed. Different techniques were used to find the key elements of these processes. In the warehouse related workshops we used the brown paper method to capture the different process steps that exist in the current process. A brown paper method is basically a way to visualize a process on the wall covered with brown papers. PostIt notes are used to place parts of the process on the paper. These PostIt notes are then moved into a process flow that everyone in the workshop can agree on.

The processes were then documented as a process flow and sent out to the responsible persons for verification. In the warehouse process stream we had about 10 workshops with in the following areas;

- Goods receipts (2 ws).
- Picking (4 ws)
- Internal warehouse processes (2 ws)
- Warehouse structure (2 ws)

Multiple workshops are needed in the different areas since there are so many points to go through. The last workshop in each area is used to really confirm that the situation has been understood in the correct way.

This phase focused mainly on getting the requirements from the business and we didn’t discuss the future process at all. Normally only key users and department managers were present but for some processes also the end users with special knowledge were involved.

5.6.3 TO-BE definition (20th September – 20th October)

The TO-BE definition aims at defining the new processes using the new ERP system. Based on the AS-IS description the processes are designed to incorporate the
functionality that the business needs. There are normally not a one-to-one relationship between the process steps in the old and the new ERP system so the important thing is to make sure that the functionality that is required can be provided in the new system. This part is also managed by running work shops regarding the different processes. The work shops are prepared by the implementation responsible, who defines a process, which is supported by the new system. The users who participated in these work shops were the same as the users in the AS-IS work shops.

The TO-BE phase was started with basic training about the terms used in the warehouse management module. It was necessary since this was a brand new module for this site and the aim was to introduce the concepts of warehouse management so that it would be easier to understand and discuss the future processes in the work shops. I think that this training was necessary but I also know that it was very difficult for the key users to take in all the new terminology.

At this time it became obvious to me that we needed to start with information meetings with the warehouse personnel. They were the group that was going to go through the biggest change in their working environment, going from a paper based system to a total system guided working process. We also realized that the key user from the warehouse department didn’t have the ability to function as the bridge between the project and the department staff. Together with the warehouse manager we set up number of information meetings, three weeks apart where we presented the progress in the warehouse related processes. In these meetings we presented the key warehouse terms trying to keep it at an understandable level. It is clear that it was hard for them to relate to the terms and I guess that the method use to present this could have been made better. We met in their rest area and we presented everything using power point and occasionally looking directly into the SAP system. A better way might have been to move directly into the warehouse and pointing out the different terms so that they where directly related to the physical objects in the warehouse that they described.

Some of the presentations where quite often met by negative reactions from the warehouse staff. They didn’t agree with the design of the new process and it became clear that the key user from the warehouse didn’t have the same idea as the rest of the warehouse staff.

5.6.4 Implementation (20th October – 10th January)

The implementation phase is normally the part where most of the development and configuration of the system takes place. This part also includes testing and development of training materials for the trainings. The implementation phase also overlaps the training phase since some parts of the processes requires shorter time in development and the training need to start quite early to be able to train the users in all the different processes.
The information meetings continued during this phase and points where raised during these meetings that where important for the final result of the solution. Time pressure also became greater during this phase and the meetings with the warehouse personnel got lower priority to be able to keep the project deadlines.

The warehouse organisation also went through a major change when a new warehouse manager was employed at the end of October. The new manager had some general skills in SAP from his previous employment and became greatly involved in the implementation right from the start. It made a lot of difference that he showed such commitment to the project and the system. In fact the new warehouse manager took on the key user role and brought in people with special skills when needed.

5.6.5 Training (10th December – 20th January)

The training was organized after a train-the-trainer method. This means that the project team trains the key users (Trainers). The key users then train the end users. The training material was provided by the project team but it is up to the key users to rebuild the training material and to translate it into their own terms that the users are used to.

The training material is usually a power point presentation which shows the different steps needed in the system. During the actual training the power point is shown and described and then the same thing is done in the system. Each person in the training has a pc so that they can reproduce the same steps. Exceptions are handled in a very limited way since it is hard to know exactly what could happen. In Figure 10, you can see a typical training material describing which actions to be taken with a screen shot of the system besides it.
The training is done in a conference room with a projector and each person who is being trained has a PC where they can practice the different steps in the training environment.

The warehouse process training started mid of December with the goods receipt processes which was the process that where done earliest and ready for training to start. This process is fairly easy and the training proceeded without any problems. It was harder
with the training of the picking process. At the beginning of the training the software didn’t have very high quality which made it frustrating for the users. It was also hard for them to relate the different steps of the picking process to the reality. They came from a totally paper based process, and where now faced with a system-guide picking process. It was hard for them to understand the rules which were used to give them the picking tasks and it was hard to know how to present this to them. They were used to being in control of what should be picked and now they where totally dependent on the system determination of the most urgent task to be picked.

5.6.6 Go-Live and support (20th January – 25th February)

Go-live means the actual turnover from the old to the new system. It includes migration of master data for customers and materials. It also includes migration of transaction data such as orders and stock figures. The shipments for the first two weeks where planned to proceed in a slow tempo to allow the warehouse to be able to prepare the shipments in a slow way to get used to the system. This is where the actual training took place of the warehouse staff and it was only at this point that they could make the connection between what was presented to them by the system and what they had to do physically. The warehouse staff became frustrated that they couldn’t handle the system them self from the beginning. It was also necessary to make some minor adjustments to adopt the picking process to some factors that where missed during the design and implementation.

The full project team gave on-site support during four weeks after the go-live.
6 Interviews

I went back to the Logistic department in Broby in July 2008, about 6 months after the completion of the implementation project. The purpose was to interview some of the people regarding the project. To get their view of the implementation process, the communication, the relationship between project team and key users, the relationship within the department during the project. The interview where designed to evaluate the implementation towards the theoretical framework built and presented in the theory chapter

Two people from customer service and logistical support (I will name them office staff) where interviewed and two more people from the warehouse (I will name them warehouse staff). During the interviews it became clear that the integration in the project was very different between these two groups. The two groups also had a very different view of the information and involvement they got in the project. The office staff in general had a good view of the information they got prior and during the project and the warehouse staff didn’t feel like they got relevant information prior to the project.

This chapter shows a summary of the finding in the interviews. More detailed information about the interviews can be found in Appendix A. The findings in the case study and the interviews will be discussed in the next chapter.
<table>
<thead>
<tr>
<th><strong>Office Staff</strong></th>
<th><strong>Warehouse Staff</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Interview 01</strong></td>
<td><strong>Interview 02</strong></td>
</tr>
<tr>
<td>General questions regarding the users role and system experience</td>
<td></td>
</tr>
<tr>
<td><strong>What is your current role?</strong></td>
<td>Key user in customer service</td>
</tr>
<tr>
<td><strong>What was your prior experience in ERP systems?</strong></td>
<td>About 20 years experience of other ERP systems</td>
</tr>
<tr>
<td><strong>Did you get any information about the project before and during the implementation?</strong></td>
<td>Yes, very involved before and during the project.</td>
</tr>
<tr>
<td><strong>Did you reflect on your processes prior to the project?</strong></td>
<td>Started to document their own processes prior to the start of the project.</td>
</tr>
<tr>
<td><strong>Positive learning environment</strong></td>
<td></td>
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<tr>
<td><strong>End User: How did you see your own relationship to the key user involved in the project?</strong></td>
<td>N/A</td>
</tr>
<tr>
<td>End User: Did you feel like you where involved in the project, how did you feel towards the project (Positive, negative, not interested)?</td>
<td>Office Staff</td>
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<tr>
<td>Interview 01</td>
<td>Felt involved and positive towards the project. Some might have felt like they where going to loose knowledge since they where experts in the old ERP system.</td>
</tr>
<tr>
<td>Key User: Did you feel like you had a good relationship with the other department members?</td>
<td>It worked very well. It was known well in advance who was going to become the key user. No one seemed to disagree with that nomination.</td>
</tr>
<tr>
<td>Key User: Did you involve the other department users in your work as a key user?</td>
<td>Gave the other users some tasks during the project. Informed the other users about the progress in the project in an informal way.</td>
</tr>
<tr>
<td>Did you feel encouraged to take the time and to make the effort to learn about the new system? If YES what encouraged you?</td>
<td>It was clear from the beginning that it was necessary for us to focus on the project. She was excited about the project and didn’t need any specific encouragement from the logistics manager. It was also challenging to get to work in the project environment which made it motivating as well.</td>
</tr>
<tr>
<td>Where you informed about how your job situation would look after the implementation? Did you feel like you lacked any information? How did this affect you, negative / positive towards the change?</td>
<td>Some where worried that there would be less work after the project that would result in reduction of staff. It might have made some of the department’s users negative towards the change but didn’t influence her</td>
</tr>
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<td></td>
<td>We where not informed by the management of how our work would be effected. But since they had good contact with the key users they got continuous information about how the new processes would look.</td>
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<td><strong>Office Staff</strong></td>
<td><strong>Warehouse Staff</strong></td>
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</tr>
<tr>
<td>as a key user.</td>
<td>staff.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>What motivated you the most to make you committed to learn the new processes?</strong></th>
<th><strong>Knowledge transfer</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mainly own motivation and commitment to learn new processes. It is exciting to get a new ERP system which gives you the opportunity to learn new things.</td>
<td>Felt prepared but it was problems with the system during the beginning of the training. It would have been better to take a session with just a description of the process before the hands on training in the system.</td>
</tr>
<tr>
<td>Her own commitment to learn new things motivated her the most.</td>
<td>It was really hard to relate the first hands on trainings to the reality. It would have been best to have a better understanding of the process before the training started.</td>
</tr>
<tr>
<td>Motivation comes by being involved. It was never possible to be involved since the key user couldn’t manage that.</td>
<td>It was not such a big problem but the main thing that was missing was the overview.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Did you feel prepared/ready to learn the new processes when you went to the training?</strong></th>
<th><strong>Where you able to relate the training to your own working processes?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>She felt like she had a good background. It would be good if it would have been possible to go into the system much earlier in order for them to get more familiar with the environment. The system was only ready for the users to use it when the training started.</td>
<td>Most of the processes in the new system are similar to the ones using the old system. It would have been much easier if someone presented the full process flow with all the parts to them.</td>
</tr>
<tr>
<td>Felt prepared but it was problems with the system during the beginning of the training. It would have been better to take a session with just a description of the process before the hands on training in the system.</td>
<td>It was possible to relate the training to the existing processes, but it was never time and possibility to go in dept into the application. We could learn the normal process but not the exceptions.</td>
</tr>
<tr>
<td>It was a lot of new things which made it hard to understand.</td>
<td>It was really hard to relate the first hands on trainings to the reality. It would have been best to have a better understanding of the process before the training started.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Did you miss any knowledge?</strong></th>
<th><strong>Did you understand the different trainings and communications made during the project?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The main thing that was missed was the how the small parts where related to each other.</td>
<td>Not so easy to relate to the physical process in the warehouse since no previous system existed.</td>
</tr>
<tr>
<td>Not at that time, but miss a follow up of the training. An in-depth second wave of training would be good now.</td>
<td></td>
</tr>
</tbody>
</table>
Hard to differentiate some terms that didn’t exist in the old ERP system (like delivery and shipment is the same thing in the old ERP system).

Many of the system terms were closely related to the terms they use in their every day work. Some terms and some naming of parts of the warehouse solution could have been more logical.

Was hard in the beginning.

The time was a factor which mad it hard to digest all the information that you where presented with during the training. The training was planned during half a day every day of one week.

The reason was that the physical connection was missing.

<table>
<thead>
<tr>
<th>Did you understand the different terms used?</th>
<th>Office Staff</th>
<th>Warehouse Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview 01</td>
<td>Hard to differentiate some terms that didn’t exist in the old ERP system (like delivery and shipment is the same thing in the old ERP system).</td>
<td>Many of the system terms were closely related to the terms they use in their every day work. Some terms and some naming of parts of the warehouse solution could have been more logical.</td>
</tr>
<tr>
<td>Interview 02</td>
<td>Was hard in the beginning.</td>
<td></td>
</tr>
<tr>
<td>Why didn’t you understand it? – ALT – Why did you understand it?</td>
<td>The time was a factor which mad it hard to digest all the information that you where presented with during the training. The training was planned during half a day every day of one week.</td>
<td>The reason was that the physical connection was missing.</td>
</tr>
</tbody>
</table>

Table 3: Overview of the findings in the interviews, for more information see Appendix A.
7 Analysis and discussion

In this chapter I will analyse the case study and the interviews in connection to the theoretical framework built in the theory chapter. I will first analyse the results in relation to building of a positive learning environment and then do the same in relation to the knowledge transfer and the information wall. For each part I will analyse the opinion of the office staff and the warehouse staff and compare the findings and relate it to the case study.

This chapter gives me the possibility to reflect on the findings in the interviews and in the case study.

7.1 Positive learning environment

The foundation of building a positive learning environment is to have a balance between the different organisational parts involved in the project. It is important to avoid creating an A and B-team where the A-team is involved and informed but not the B-team, according to the theory of balanced social capital (Fugate, Kinicki & Prussia 2008). It is also important to justify the effort required by the people to be involved in the project; they should feel like they will benefit from the extra time and energy they put into learning a new system to create a positive social exchange (King & Burges 2006). A higher degree of coping gives the users a higher ability to accept a higher work load and accept that more effort will be required by them. This is achieved by making the users feel involved during the project and communicating with them about the project and asking their opinion. The proportion of change must be divided in a proportionate way for the users to not loose their commitment to the project.

The office staff had a good relation between users and key users. The key users selected were respected by the other users and they had good informal information sharing during the project. The key users were very well established in the organisation and used to have similar tasks in the department before. They key users were always easy to approach and they didn’t create a border between themselves and the other department staff. During the project the key users gave the users information about the development in the project and asked them to review their own processes to see if things where missing. The users felt involved in the process and were rewarded with regular information from the key users. Some of the users felt like it would be hard for them to leave a system that they where experts in and instead become beginners in the new system. According to some users the main motivation factor was mainly own motivation to learn something new. It could have been good with more formal encouragement from the management during the project. The information regarding how their work processes was going to be affected came mainly from the informal information they got from the key users. The end users had dedicated scheduled time in their planning to work with online training material and to put time into analysing questions from the key user. The training started quite late which made the time
before the go-live very intensive for the key user and the users. They had trainings every week and they had to manage their work at the side of that. Thanks to motivated users this was possible.

The warehouse staff had a quite different view of how they where organised during the project. Their key user didn’t have the support by the warehouse staff. Instead they where worried that the correct information about their work processes would never be transferred to the project team. The users didn’t feel involved in the project since they didn’t get any information from the key user. The only information they got during the project came from the project teams regular formal information meetings regarding the implementation of the warehouse processes. One warehouse worker approached the key user but still didn’t manage to start a dialog about the project. Before the project the warehouse staff got information from the warehouse manager that the project would mean that they would reduce staff in the warehouse. This brought down the motivation among the warehouse staff and made them reluctant to commit to the project. A change in attitude towards the project came when the new warehouse manager started. He took the role as key user and involved different people from the warehouse in the project. The commitment increased among the warehouse staff since they saw the warehouse manager put so much energy into the project. They also felt more involved since the warehouse manger always asked their opinion.
### Table 4: Evaluation of factors influencing a positive learning environment.

<table>
<thead>
<tr>
<th></th>
<th>Office staff</th>
<th>Warehouse staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balanced social capital</td>
<td>Positive during the whole project time.</td>
<td>Negative during most part of the project. Increasing at the end.</td>
</tr>
<tr>
<td>(King &amp; Burges 2006)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive social exchange</td>
<td>Positive during the whole project time.</td>
<td>Negative during most part of the project. Increasing at the end.</td>
</tr>
<tr>
<td>(Fugate, Kinicki &amp; Prussia 2008)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased coping</td>
<td>High acceptance thanks to good communication between key user and users.</td>
<td>Low acceptance towards the project due to little information. Higher at the end.</td>
</tr>
<tr>
<td>(Fugate, Kinicki &amp; Prussia 2008)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher employee commitment</td>
<td>Balanced work load during most part of the project. Last month was very hectic since the trainings where held at that time.</td>
<td>Low employee commitment to start with. Motivated at the end since the new warehouse manager put so much energy into the project.</td>
</tr>
<tr>
<td>(Fedor, Caldwell &amp; Herold 2006)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thanks to the key users a positive learning environment were created for the office staff. The key users involved the users naturally in their work and bridge the gap between project team and end users. This avoided making the users feel degraded since they were not part of the project. The end users could feel that they contributed by reviewing their own processes and by giving input which were taken seriously by the key users. The work load was getting higher at the end of the project. The main factor influencing this was that the system was not ready for training early enough. If the training would have started a few weeks earlier it would have allowed more gaps between the trainings and allowed a slower tempo for the users.

The warehouse staff had a quite opposite view, and a mostly negative learning environment. The main reason was of course the unlucky selection of key user. Due to the missing communication between the key user and the end users it created a feeling of exclusion from the project. When this negative feeling started it didn’t mean much that information meetings were held regularly by the project team. The source of this problem should have been discovered earlier in the project which would have created a better environment. A major change came when the new warehouse manager started and became involved as the real key user in the project. The other warehouse staff were being involved and asked to give feedback to processes etc.
7.2 Breaking the information wall

Many steps are involved in making sense of data being transmitted from one person to another. Checkland and Holwell (1998) showed us their view of this transformation as a four step process where data is transformed into knowledge. When transferring knowledge from one person to another it is of course essential that the receiving person can transform that information into knowledge. This knowledge should be used by them in their everyday work to solve problems or just to execute various processes. To help make it easier for the transformation from data to knowledge it is important that the person who conveys the message is using a language, which makes it easier for the receiver to understand what is being said. This leads to decreasing the phenomeno-semantic complexity (Eriksson 2007). This is done by establishing a common language to avoid misunderstandings. The student should also be prepared so that their ability to understand the information is as good as possible. This can be done by reflecting on their own processes to make them more aware of the steps involved in their own routines. This will hopefully increase their absorptive capacity (Wang et al 2007, Boynton, Zmod & Jacobs 1994) which will make it easier for them to understand the training and communication by the project team.

The office staff started early to look into their existing processes and documenting them in detail. They felt like they discovered parts of their processes that they didn’t really reflect on earlier. This work made them more prepared for questions from the project team and also more aware of the details that where hidden in their own routines. They could understand the training but had a problem to see where the processes being trained would fit into the whole. They said that they would have benefited a lot from getting an overview training which placed their part into the whole. It would have made it easier for them to understand the training if they had the whole picture first.

The office staff also complained about the tight training schedule, which made it very hard to digest all the information. It would have been much better if the training was spread over a longer time span so that it wouldn’t have been so intensive. They also would have liked to get access to the training environment much earlier so that they could get familiar with the basic functionality of the system. The detailed functions wouldn’t have been necessary at that time but at least it would have made it easier to understand the complicated parts of the training if the basics where known in advance.

Regarding the communication language used during the training they only had minor problems to understand it at the beginning. Some terms where at first hard to relate to since that particular part of the process didn’t have any equivalence in the old system. They also suggested that it would have been good if the training in some way could have related the terms to the old system. This would have made it easier to connect and to understand some parts of the training.
The warehouse staff didn’t have the same involvement in the project as the office staff. The main reason where that the key user didn’t function as the link between the project and the other staff in the department. Due to the bad relationship between the key user and the warehouse staff they where not prepared in the same way as the office staff when it came to the training. It was also a different situation for the warehouse staff since they didn’t have any system support in their daily work, they could only relate to their manual processes. The process which they were to be trained in was going to be totally different from the manual process they were used to.

The warehouse staff expressed that it was difficult for them to understand the training at the beginning. They said that “Instead of going directly into the training of the different processes it would have been much better if they got training in the full process first”. It was hard for them to understand the full picture (the same comment was given by the office staff). Some of the functions that the warehouse staffs were trained in where not fully working when the training started. This made it complicated to understand the full process, also some functions where changed or added during the training. It would have been easier if the functionality was stable before the training started.

The terms used were mostly understandable since they related to terms they used in the warehouse. But some things could also have been named in a better way so that it would correspond better with reality. The main problem with the training was that it didn’t have any direct connection with the physical flow. The training became much more theoretical which made it difficult to understand when you don’t have any system experience prior to the training. It would have been much better if the training could have a connection to the physical process. For example, when training the picking, it would have been much better if it was possible to go and pick the pallet physically at the same time. The training would then have made much more sense to them. Instead the real training only took place after the go-live during first two weeks when realistic tasks where given to the warehouse staff and they could perform the actions in the system together with the physical action like picking, labelling and loading.
Table 5: Evaluation of factors influencing the information wall.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Office staff</th>
<th>Warehouse staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding of the knowledge transfer</td>
<td>Good but could have been better if they understood the full picture.</td>
<td>Hard to understand when it is not related to physical flow.</td>
</tr>
<tr>
<td>Trainers semantic complexity (Eriksson 2007)</td>
<td>No problems to understand the training but sometimes it would have been good to relate the new terms to the old system.</td>
<td>It would have been much easier for the warehouse staff if the training related to the physical flow. It would also have been better to give a better overview before the process training started.</td>
</tr>
<tr>
<td>Absorptive capacity (Wang et al 2007, Boynton, Zmud &amp; Jacobs 1994)</td>
<td>Good, since they worked a lot with their own processes and where very familiar with the business.</td>
<td>Not so good since they didn’t have any old system to relate to. It was hard to prepare them for what was coming.</td>
</tr>
</tbody>
</table>

Both the office staff and the warehouse staff thought it would have been easier for them to understand the training if they were given an overview of the full process before the training started. The warehouse processes where for example not explained to the offices staff and the order, delivery and shipping processes were never explained to the warehouse staff. I think that by giving them a better understanding of the related processes they would have had a better chance to understand the source and destination of their own processes. After all in a fully integrated system the processes are tied together and it is important to have some knowledge about the different steps of the end-to-end process. The end-to-end process order-to-cash would be the most relevant process to explain to both the office staff and also the warehouse staff. It would have made them understand where their part of the process starts and ends and how it fits into the whole. It would also make them understand how important their part is for the full process to be completed. For example if the warehouse staff, fail to pick the correct goods, the invoice will be wrong and a claim will be issued by the customer. The same way goes for the office staff, which needed to know what is required for the warehouse staff to finish their part of the order-to-cash process.

It was pointed out that it is good to relate the new terms to the terms used in the old system. This is in some cases was difficult to achieve since the project team in many cases don’t have in-depth knowledge about the old system. But one could imagine arranging some kind of mapping exercise together with the key users to relate the terms in the new
system to the once used in the old system. This mapping could then be used during the training sessions. Although it could be of great help to have such a mapping it is also important that the new terms are used in the training. Without getting familiar to the new terms it is very difficult to get used to, and be able to use the new system.

The warehouse staff would have been greatly helped by a more interactive training where the physical actions where taken at the same time as they got the task in the system. It would have made it easier for them to understand how the system worked and how they would use the system. It is hard to organize such training, since it requires preparation of realistic training cases and also to have the correct goods available in the warehouse. Maybe it could be simulated with some kind of building blocks like LEGO or something. These could have been used to reflect the pallets in the warehouse. The problem is that it takes time and resources to prepare this type of training. The actual training where instead done after the go-live when the first picking tasks where given to the warehouse staff. They could then perform the action in the system together with the physical action which made it much easier to make sense of the information they where given by the system.

The absorptive capacity of the warehouse staff was not so good, much depending on their background. It is much easier to learn a new system if you are already used to an old system. The warehouse staff came from a totally manual system, with paper lists (picking documents) telling them what to do. They had the power to decide themselves in which order they where going to perform their tasks and from where in the warehouse they would take the stock. The new system would tell them all that, in which order to pick and exactly from which location the goods were to be taken from. It could have been easier if they were given more information during the project about the processes. They could then digest and talk about this between them, which could have made them more absorptive to the new ways of working. Also as stated in the section about the learning environment, it was not a good atmosphere among the warehouse staff towards the project, which highly influenced their acceptance negatively towards the project.

7.3 Critical analysis of results

I realise that the answers I got in the interviews where highly dependent on the questions I have asked. The questions where designed to analyse the users experiences based directly to the frameworks building blocks. You only get answers to the questions you have asked. Another approach could have been to start without a theoretical framework. By asking the users first maybe I would have directed the theoretical study in another direction.

The case study was a project that I was heavily involved in myself. I have tried to give an objective view of the case so that the reader gets a good understanding of the process used to implement the ERP system. I hope that my involvement in the project
didn’t affect my objectiveness in any way that would have affected the findings in this thesis.

Even though my intention was only to study the aspects of knowledge transfer in ERP projects, the result of the theoretical study and the case study affects the whole implementation project. The result is actually more of a change management strategy to focus on the end users needs and to build a good project environment that promotes learning. I didn’t fully understand this at the beginning of this project but it became clear during the analysis that you can’t just look at the training part of the project you need to have a methodology that involves the different people in the organisations and builds a sense of commitment to learn the new processes that are being implemented. This is nothing that can be done at the end of the project; instead it must be a core part of the project.
8 Conclusion

The theoretical framework presented in this paper shows that correct communication between management and employees, between the project and the end users, between the end user participating in the project and those who are not, are very important. By letting people know what is happening in the project it creates a good learning environment, which has been shown to be very important. The response from the employees interviewed showed that they who where involved in the project where more positive to the change, compared to those who didn’t get as much information. The negative attitude towards the project affected their interest in learning and affected their capabilities to understand the new processes. It is clear that any ERP project should think much about the way that they are communicating with the end users. The extra effort taken to manage this communication will be paid back in increased performance from the employees and a positive atmosphere in the project. My experience is that implementation of an ERP system always requires changes in the processes, affecting the end users the most. And at the end, when the ERP system is in place, the success of the implementation depends on how well these end users can manage their work in the new system. The focus must be to give them the right foundation by training them to do their job using the new ERP system. Theories presented in the thesis shows that building a positive learning environment, by creating a balanced social capital and positive social exchange (King & Burges 2006), and by increase coping (Fugate, Kinicki & Prussia 2008) and create higher employee commitment (Fedor, Caldwell & Herold 2006), gives a great reward in the ability that employees will accept the changes. These theories form the first part of the framework which focuses on creating a positive learning environment.

![Building a positive learning environment](image)

Figure 11: Building a positive learning environment.
The case study shows that the learning environment can differ widely between departments in an organisation. One department or group of people in an organisation can feel very involved and be very motivated while another one can have the opposite feeling. It is therefore important not to miss anyone when you work with the learning environment. Everyone is at the end part of the supply chain in the company and everyone needs to be equipped to delivery the service required of them from day one with the new system. The chain is never stronger than the weakest link and that is very true in this case as well. It is easy to forget one group of people in an organisation that may be consider as less important. The risk taken with this negligence is that one part of the chain is broken, which may cost dissatisfied customers.

The theory, and confirmed by the case study, shows that it is important to stimulate users in the organisation in order to increase their ability learn. By triggering small tasks in the organisation it is possible to increase the absorptive capacity (Wang et al 2007), which will give a better result of the trainings. It can be achieved by asking the users to reflect on their processes, and making them more aware of their current working processes. The responsibility is then on the trainer to understand that the semantics of the training will influence the end users ability to understand what is said. A common language need to be established so that trainer and end user understand the terminology and can relate it to their own processes. My experience is that it often is hard to understand each other due to the difference in terminology. End users are used to their own terminology often related to their business or their previous ERP or IT system, while the consultants of the ERP experts are often stuck with the terminology of the system. It is hard break away from old expressions but it is necessary to establish a common vocabulary that is used during the project and the trainings. Often it will be the vocabulary of the new system since this is what the users will be using in the future. It is therefore important to make a translation between old and new vocabulary so that this don’t need to be discussed during the actual end user trainings. It should be done early in the project so that communications and project discussions can be understood by everyone. Checkland and Holwell (1998) claims that there are four steps involved in transforming data to knowledge. The data and capta is kept by the submitter of information (or trainer if you like). The transformation of data and capta into first information and then knowledge is done by the receiver of information (or student). Eriksson (2007) suggests that by carefully defining a common language there is a lower chance that the semantic transformation will result in a distortion of the information. By decreasing the semantic complexity it will be easier for the student to understand and make sense of the information that the trainer is trying to convey. The second part of the framework combines the theories above to shows how to break the information wall that in many cases exists between the trainer and the student.
8.1 Final discussion

I think that this thesis gives enough motivation to any ERP implementation project to focus greatly on the change management and the training during the implementation. An ERP project is a great deal more than finding solutions to technical problems. It is a change that affects the employees in the organisation and this change need to be managed in a proper way. I suggest that one role in an ERP project should be responsible for coordination of the change management related activities. This role should have the responsibility to manage the way the change is brought to the organisation. It includes:

- the organisation of the project in terms of involvement from the business. The business always has to contribute with resources and it is important that these resources have the competence required by this role. The case study earlier in this thesis showed how wrong it can get when the wrong person takes on this role. It is important that the responsible persons from the business are coached in their way to integrate and include their colleagues in the project. The aim is to keep a balanced social capital and positive social exchange within the organisation.
• the management of the communication throughout the project. By regularly communicating project status, decisions, achievements etc to all people affected by the change. The communication doesn’t necessarily need to be done by the change management responsible but it should be controlled and structured by this role. The aim is to increase the acceptance to the project and increase the employee’s ability to cope.

• the design of the training strategy. By building a common concept for how the training to the end users should be designed. The different types of employees needs should be taken into account by building their ability to learn during the project, so that their absorptive capacity is increased. It is also important to establishing a common vocabulary that everyone understands, both trainer and student, so that the training can be conducted in an efficient way.

It should be of the interest for businesses implementing ERP systems to invest in such a role as the one described above. But I realize that it requires knowledge and understanding of the importance to focus on change management. To my experience the training and communication to the people around the project always have a lower priority than the design and the implementation of the processes in the system. All the ERP implementation projects that I have been part of had a very tight time line and it is easy to cut in the area of change management. I guess that part of the reason is the limited knowledge in the effects that change management has on the end result of a project. While the managers of ERP implementation often are very skilled in the implementation of the ERP system they have less knowledge in the softer parts related to change management that I have described in this thesis.

8.2 Future research

This thesis focused only on the knowledge transfer process in ERP projects. The result became very much a contribution to change management since I realised that the training phase of the project is not independent of the other parts of the project. To build a good environment for learning you need to focus on this from the start of the project. It would be interesting to dig deeper into this and to understand how current change management theories can benefit from what has been learnt in this thesis. It would also be interesting to know if the findings in this thesis could be adopted in other types of IT projects as well, maybe even in projects that are not directly IT related.
9 References


Glaserfeld, Ernst von (1995), Radical constructivism, A way of Knowing and Learning, Antony Rowe Ltd, Eastbourne.


10 APPENDIX A – Case study interviews

**Interview: 01.**

**General questions regarding the user’s role and system experience**

| **Question:** What is your current role |
| Key User in customer service and logistics |

| **Question:** What was your prior experience in ERP systems? |
| About 20 years experience of other ERP systems. Always in logistics, sales and customer service. |

| **Question:** Did you get any information about the project before and during the implementation? |
| Got quite a lot of information from the logistics manager. Was also initiating a lot of information gathering before the project. She new that she would be the key user for her areas very early and was aware that if she knew more it would benefit in her work. So a lot of self initiated information search but also supported by the management which didn’t hide any information that they got. |

| **Question:** Did you reflect on your processes prior to the project? |
| She got an assignment by the logistics manager to start to look at their own processes before the actual project started. It was a very use full experience since it made them reflect on the details of the process. The result was a written AS-IS description of their processes. The work with their own processes help to make them more prepared for the questions that were raised by the project team. |

**Positive learning environment**

| **Question:** End User: How did you see your own relationship to the key user involved in the project? |
| Not relevant, only for End User |

| **Question:** End User: Did you feel like you were involved in the project, how did you feel towards the project (Positive, negative, not interested)? |
**Question:** Key User: Did you feel like you had a good relationship with the other department members?

It worked very well. It was known well in advance who was going to become the key user. She already had an informal role to handle new processes in the organisation. No one seemed to have any objections against her as a key user since her role was such with the old system as well.

**Question:** Key User: Did you involve the other department users in your work as a key user?

She gave her users some tasks during the project. The users also had scheduled time slots when they should work with the online training tutorials. She also informed her users about the progress in the project. This was done in an informal way at coffee breaks or informal meetings in the office. None of the meetings were scheduled as formal information meetings. She also informed her users when it was clear that some of the processes would change compared to the old ERP system. She would get their opinion about the changes and could go back to the project team and discuss these questions.

**Question:** Did you feel encouraged to take the time and to make the effort to learn about the new system? If YES what encouraged you?

It was clear from the beginning that it was necessary to focus a 100% on the project to be able to make it to the deadlines. They had been waiting a long time for the system change and were therefore very motivated to participate in the project. She says that she didn’t need any specific encouragement from the logistics manager and that she was motivated to make the project a success. It was a limited time period that they had to work extra hours and put more effort which made it worth it. It was also challenging to get to work in the project environment which made it motivating as well.

**Question:** Were you informed about how your job situation would look after the implementation? Did you feel like you lacked any information? How did this affect you, negative / positive towards the change?

The customer service department was worried that there would be less to do for them after the ERP implementation. A small risk existed that someone would have to go after the implementation due to lack of work but this could only be evaluated after the implementation. It might have made some of the department’s users negative towards the change but didn’t influence her as a key user.

**Question:** What motivated you the most to make you committed to learn the new
Mainly own motivation and commitment to learn new processes. It is exciting to get a new ERP system which gives you the opportunity to learn new things. The system change also brought them into the same system as the other sites which made it even more exciting.

### Knowledge transfer

**Question:** Did you feel prepared/ready to learn the new processes when you went to the training?

She felt like she had a good background. Since she was the key user she had already seen the system a few times and was familiar with the processes from the discussions with the project team. In this was the terms and the system language was already familiar to her.

It would be good if it would have been possible to go into the system much earlier in order for them to get more familiar with the environment. The system was only ready for the users to use it when the training started only about a month before the go-live. It would have been easier for the users if the could have got some kind of testing environment with at least a light system to be able to do some hands on training on their own before the training started.

**Question:** Were you able to relate the training to your own working processes?

Most of the processes in the new system are similar to the ones using the old system. This makes it easier to relate the training the old way of working. But of course some processes are brand new and others are very different. It would have been much easier if someone presented the full process flow with all the parts to them. Now the training was only directly focused on a specific process. No one was presented with a full picture of were their process was located in relation to the others. For example, how is the finance processes related to the goods receipt process and so on?

**Question:** Did you miss any knowledge?

The main thing that was missed was the how the small parts were related to each other. How is the warehouse management part related to the sales part and how is the finance part

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<tr>
<th>Question: Did you understand the different trainings and communications made during the project?</th>
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**Question:** Did you understand the different terms used?

**Question:** Why didn’t you understand it? – ALT – Why did you understand it?

**Question:** Others

We would have needed longer support during the project start up. In the start it was supposed to the 6 to 7 weeks after the go-live but this was later limited to 3 – 4 weeks.

We also would need a second wave of training. To be able to use the system with all the features it is necessary to take it in two steps. Now after half a year we would be ready for this second step.

**Interview: 02.**

**General questions regarding the user’s role and system experience**

**Question:** What is your current role

User in logistics and customer service. Key user and user when it comes to the full sample process, production to stock and shipping.

**Question:** What was your prior experience in ERP systems?

About 15 years experience of other ERP systems.

**Question:** Did you get any information about the project before and during the implementation?

Got information from the logistic manager about the project dead lines.

**Question:** Did you reflect on your processes prior to the project?

She did her own AS-IS description of the sample process. It was good to reflect on the
different small process steps that are taken for granted when you do the work every day.
Discovered the process again basically.

Positive learning environment

**Question:** End User: How did you see your own relationship to the key user involved in
the project?

The key users involved the users a lot in their work. They did this in all the project phases.
The key users asked the users to think about their processes and to inform the key users if
anything was not correct or if they had questions. If any user feels like they were not
involved it would be their own fault, the key users were always easy to approach.

**Question:** End User: Did you feel like you were involved in the project, how did you feel
towards the project (Positive, negative, not interested)?

Felt involved and positive towards the project. The biggest reason is that she has a positive
attitude toward change which made her see the project as a positive thing. It was also a
positive atmosphere among the colleagues. Some might have felt like they were going to
lose knowledge since they were experts in the old ERP system, and they were to be come
beginners in SAP.

**Question:** Key User: Did you feel like you had a good relationship with the other
department members?

**Question:** Key User: Did you involve the other department users in your work as a key
user?

**Question:** Did you feel encouraged to take the time and to make the effort to learn about
the new system? If YES what encouraged you?

Yes, felt motivated but not because she was motivated by the manger but because of her
own commitment and involvement. She is motivated by learning something new and that
was manly what made her committed towards the project. Could maybe have been some
more formal encouragement from the management.

**Question:** Were you informed about how your job situation would look after the
implementation? Did you feel like you lacked any information? How did this affect you,
negative / positive towards the change?

We were not informed by the management of how our work would be affected. But since they had good contact with the key users they got continuous information about how the new processes would look.

**Question:** What motivated you the most to make you committed to learn the new processes?

Her own commitment to learn new things motivated her the most.

### Knowledge transfer

**Question:** Did you feel prepared/ready to learn the new processes when you went to the training?

**Question:** Were you able to relate the training to your own working processes?

It was possible to relate the training to the existing processes, but it was never time and possibility to go in dept into the application. We could learn the normal process but not the exceptions.

**Question:** Did you miss any knowledge?

Not at that time, but miss a follow up of the training. An in-depth second wave of training would be good now.

**Question:** Did you understand the different trainings and communications made during the project?

**Question:** Did you understand the different terms used?

Hard to differentiate some terms that didn’t exist in the old ERP system (like delivery and shipment is the same thing in the old ERP system). This was only hard in the beginning until they got used to it. It makes it easier to if the trainer relates to the old system in the training.

**Question:** Why didn’t you understand it? – ALT – Why did you understand it?

The time was a factor which mad it hard to digest all the information that you were
presented with during the training. The training was planned during half a day every day of one week. It would have been much better to plan the training during a longer time period so that it would have been possible to reflect on the training and to prepare for the next training.

Question: Others

The support from the project should have been longer after the implementation. The support was only 3 – 4 weeks and should have been at least 3 weeks more.

Interview: 03.

General questions regarding the user’s role and system experience

Question: What is your current role

User in the warehouse. Driving fork lift performing warehouse tasks like picking, goods receipt etc.

Question: What was your prior experience in ERP systems?

No ERP system experience at all. Only general IT knowledge as a home user.

Question: Did you get any information about the project before and during the implementation?

Some limited information from the warehouse manager. Got most of the information informally from other people in the department. The choice of key user was not very lucky for the warehouse part and this influenced the integration of the users with the project team.

Question: Did you reflect on your processes prior to the project?

In an informal way the users were asked to reflect on their processes. But they were not asked formally to do this.

Positive learning environment

Question: End User: How did you see your own relationship to the key user involved in the project?
He tried to get more contact with the key user but didn’t manage to get a dialog. No initiatives were take by the key user to integrate with the users and to get them involved. He never felt involved in the project since the communication with the key user didn’t work.

**Question:** End User: Did you feel like you were involved in the project, how did you feel towards the project (Positive, negative, not interested)?

Didn’t feel involved in the project. The project team should have been more involved in the working environment so that they could have learnt our processes. Instead one key user worked with the project team, it is impossible for one user to know all the specific parts of the process.

**Question:** Key User: Did you feel like you had a good relationship with the other department members?

**Question:** Key User: Did you involve the other department users in your work as a key user?

**Question:** Did you feel encouraged to take the time and to make the effort to learn about the new system? If YES what encouraged you?

Felt motivated and it felt exciting to learn something new. More own commitment than being motivated by the management. Motivated by that it would be a better work process than before. The project team informed the warehouse personal at regular intervals which mad you interested. At the same time some people were worried that their current knowledge would be useless after implementation of the new system.

**Question:** Were you informed about how your job situation would look after the implementation? Did you feel like you lacked any information? How did this affect you, negative / positive towards the change?

The warehouse manager was always stressing that the implementation of the new system would mean that the number of warehouse staff would be cut. This brought down the motivation among the warehouse staff. The information meetings held by the project team gave the best information about how the warehouse work would look after the implementation. Felt like the project went to fast.

**Question:** What motivated you the most to make you committed to learn the new
Motivation comes by being involved. It was never possible to be involved since the key user couldn’t manage that. To be more involved would also bring higher commitment to the project.

## Knowledge transfer

**Question:** Did you feel prepared/ready to learn the new processes when you went to the training?

Felt prepared but it was problems with the system during the beginning of the training. The application was not completely developed and some function changed during the training. It would have been better to take a session with just a description of the process before the hands on training in the system. This would have created a better understanding.

**Question:** Were you able to relate the training to your own working processes?

It was really hard to relate the first hands on trainings to the reality. It was like a brand new experience since the warehouse didn’t have any it support system at all prior to this implementation. It would have been best to have a better understanding of the process before the training started.

**Question:** Did you miss any knowledge?

Should have got some information about the process before the training. The focus on the training moved from the practical system training to other questions regarding the process.

**Question:** Did you understand the different trainings and communications made during the project?

Thought it was good. But not so easy to relate to the physical process in the warehouse since no previous system existed.

**Question:** Did you understand the different terms used?

Many of the system terms were closely related to the terms they use in their every day work. Some terms and some naming of parts of the warehouse solution could have been more logical.

**Question:** Why didn’t you understand it? – ALT – Why did you understand it?
Question: Others

The motivation was low mostly due to the fact that it was impossible to integrate with the project through the key user.

**Interview: 04.**

**General questions regarding the user’s role and system experience**

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<tr>
<th>Question: What is your current role</th>
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<tbody>
<tr>
<td>Warehouse user</td>
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<table>
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<tr>
<th>Question: What was your prior experience in ERP systems?</th>
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<tr>
<td>Experience from production system but very limited. No other it experience.</td>
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<tr>
<th>Question: Did you get any information about the project before and during the implementation?</th>
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<tr>
<td>Some information about that the project. The manager had a formal information meeting mostly regarding the managers own visions with the project. Also presented the time plan of the project briefly. The manager’s visions showed later not to be related to reality.</td>
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<tr>
<th>Question: Did you reflect on your processes prior to the project?</th>
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<tr>
<td>No, no one said anything about that.</td>
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**Positive learning environment**

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<tr>
<th>Question: End User: How did you see your own relationship to the key user involved in the project?</th>
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<tr>
<td>No connection with the key user at all. A new manager was employed during the project and he later became the new key user. The first key user was never approved by the other warehouse personal. A lot of it was discussed among the workers in the warehouse but it was never brought to the management.</td>
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<tr>
<td><strong>Question:</strong> End User: Did you feel like you were involved in the project, how did you feel towards the project (Positive, negative, not interested)?</td>
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<tr>
<td>In the beginning it was not positive at all since we were not involved. This became better when the new manager started and took over the key user role.</td>
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<th><strong>Question:</strong> Did you feel encouraged to take the time and to make the effort to learn about the new system? If YES what encouraged you?</th>
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<tr>
<td>Motivated to learn something new. This was own commitment that grew out of the challenge to learn something new. The new warehouse manager put a lot of effort into the project which made it motivating to participate and to learn as much as possible.</td>
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<tr>
<td>No we were not informed. We should have got more information during the project. The connection between the warehouse users and the key user was missing which stopped the normal information transmission.</td>
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<th><strong>Question:</strong> What motivated you the most to make you committed to learn the new processes?</th>
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<th><strong>Knowledge transfer</strong></th>
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<td><strong>Question:</strong> Did you feel prepared/ready to learn the new processes when you went to the training?</td>
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<tr>
<td>It was a lot of new things which made it hard to understand. It would have been good with initial overview training for the warehouse part. This would have made it easier to</td>
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</table>
understand the different parts in the other trainings.

**Question:** Were you able to relate the training to your own working processes?

It was not such a big problem but the main thing that was missing was the overview.

**Question:** Did you miss any knowledge?

**Question:** Did you understand the different trainings and communications made during the project?

**Question:** Did you understand the different terms used?

Was hard in the beginning.

**Question:** Why didn’t you understand it? – ALT – Why did you understand it?

The reason was that the physical connection was missing.

**Question:** Others

It didn’t feel like the training was enough the real training came when we started to run the system live in the warehouse. The main problem was that it is hard to see the physical process when you run the training.

It was the commitment from the new warehouse manager that made us through the go-live.