2005:187 SHU

MASTER'S THESIS

How to Transform a Network Organization into a Virtual Organization

Six factors to be aware of before implementing ICT

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2005:187 SHU • ISSN: 1402 - 1773 • ISRN: LTU - CUPP--05/187 - - SE

Foreword

This C-thesis "How to transform a network organization into a virtual organization - Six factors to be aware of before implementing ICT" is my examination on C-level in Informatics and Systems Science.

First and foremost, I would like to thank my supervisor Birgitta Bergvall-Kåreborn for your incredible professional guidance in both essay writing, tips, infinite questions and explanations. To have you as my personal supervisor has been worth gold even if sometimes I tear my hair out trying to understand what you really mean. You have the ability to make me turn the problem over in my mind repeatedly, until I don't know what I'm doing or thinking. However, after a while at home with my forehead in deep wrinkles, it becomes clear and understandable. I have become wiser by the help of your enormous competence.

I would also thanks BIFUN's manager, Anders Wäppling, and the four companies for all the time I have taken up, and for answering my questions at the interviews. Without this organization I wouldn't have come to the insight and knowledge that I have today about network- and virtual organizations.

I would like to give emotional thanks to my family, for their wonderful support when I decided to write this study alone, and especially to my wonderful Per, for his encouraging words when I got stuck and saw no ending to this work.

Last but not least, special thanks to my friend Louise for her invaluable help in giving this study correct English language.

Without these persons, this research wouldn't have been possible for me to realize, so once again thanks.

Luleå, July 2003

Abstract

Virtual organizations are needed for several purposes and are justified by several reasons. New products, the globalization and internalization of businesses create new kinds of challenges for the management of work processes and practices. The Information and Communication Technology (ICT) has enabled a decentralization of work and by evolving technologies it has created pressures for new organizational structures and job contents. Future mobile and wireless technologies will revolutionize the working life completely by increasing possibilities to work whenever in any place. It is clear that organizations in both the private and public sector have to redesign themselves to fully utilize these new technologies if they are to survive in the dawning spatially and temporally compressed world. Therefore, the number of virtual organizations increases.

In this study I will examine what factors an organization's management should be aware of before implementing ICT in a network to become a virtual organization. Without considering these factors, there is a large risk that the implementation of the new technique will be a wasted effort or irrelevant since the management hasn't been conscious of the important factors that explain why the company and its employees like and would prefer to use ICT. This should be illuminated before an implementation since it is a very sensitive phase and an expensive investment.

The empirical study I have done, and the theories I have used, shows that it's the experience and competence of the employees that become the most important means in the good work of change. Furthermore, changing measures that builds on participation, security, abundant and direct information and mutual confidence are often usually welcome and seen as positive. Further, employees are often negative or resistant against organizational change which is logical since most organizational changes are micro-managed, and the employees are presented a pre-packed measure, which they have no ability to influence. In order to avoid making the implementation of new technology a wasted effort or irrelevant, I believe that one must be conscious of the factors that lead to why humans like to use and prefer ICT as a main working aid before it is implemented since it is an expensive investment. By observing communication and information in an early stage; giving the same, continuous, information to all members at the same time; analyzing the role of ICTs, getting the employees involved, having employee education and training of the ICT; and finally using the same way of communication within the organization, the changing work will run smoother, the result will become better, and the employees will be positive both toward the manager and to the change.

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1 Introduction

The pressure on small and medium sized companies to become virtual organizations is immense today, and this will probably only increase in the future since the business environment for organizations is changing at an increasing rate. Companies are moving away from hierarchies to networks and from centralized to decentralized structures.

French & Bell (1999) say that organizations today are faced with multiple challenges and threats. Threats to effectiveness, efficiency, and probability; challenges from turbulent environments, increased competition, and changing customer demands, and the constant challenge to maintain congruence among organizational dimensions such as technology, strategy, culture and processes. Keeping organizations healthy and viable in today's world is a daunting task.

Virtual organizations are needed for several purposes and are justified by several reasons. New products, along with the globalization and internalization of businesses, create new kinds of challenges for the management of work processes and practices. The globalization of economies and businesses increases the number of enterprises without boundaries, creating multi-site working in cross-cultural contexts. In order to take full advantage of these changes, businesses must organize themselves along radical new lines (Vartiainen, 1991).

In addition, Jarvenpaa and Leidner (1998) state that when companies expand globally, face increasing time compression in product development, and use more foreign-based subcontracting labour, virtual organizations promise the flexibility, responsiveness, lower cost, and improved resource utilization necessary to meet ever-changing task requirements in a highly turbulent and dynamic global business environment. Advances in the capabilities of computing and telecommunications technologies have enabled virtual organizations to acquire and retain distributed structures by supporting coordination among people working from different locations. According to Daniels (1998, p.9) "Globalization is a competitive necessity that allows a company to keep up with the competition, keep abreast of new trends in technology and take advantage of developing business opportunity and risk. These objectives cannot be accomplished without IT".

In spite of the rapid increase in the number of organizations that are becoming virtual organizations, there is not a clear–cut definition of this concept. Numerous authors have suggested different definitions. According to Ahuja and Carley (1998), a virtual organization is a geographically distributed organization whose members are bound by a long-term common interest or goal, and who communicate and coordinate their work through information technology. According to another definition, a virtual organization is a small, core organization that outsources major business functions. In structural terms, the virtual organization is highly centralized, with little or no departmentalization (Robbins, 2001).

Jackson's definition (1999) regarding organizations as virtual organizations (VO's) is a very technical perspective. The term virtuality was first coined in the field of information technology where it was used to describe memory that could be activated ("put into being") only for a specific purpose. With such task specificity it is possible to make computer memory appear bigger than it is in reality. It was applied to organizations to preserve a similar phenomenon; this being organizational structures and processes that do only exist when activated. Thus, virtual organisations appear big on the outside, while being small on the inside. This is possible with the extensive use of computer-mediated networks. Virtual organizations have been described as "dynamic networks of knots (individuals, organizational sub-units, organizations) whose (computer-mediated) links are configured dynamically and only for specific problems" (Picot et

al. in Jackson, 1999). Hence, virtual organizations are characterized by a constant process of shaping and re-shaping (Barnatt; Davidow & Malone; in Jackson, 1999).

Moreover, Ahuja and Carley (1998); Daniels (1998); Jarvenpaa and Leidner (1998) have all suggested that ICT are the important "organizational glue" that hold the virtual organization together although it is geographically dispersed. They even argue that information and communication technologies are a prerequisite to carry out the work in virtual organisations. Despite this, many organizations see themselves as virtual organizations yet operating without ICT. In this thesis, I regard such organizations as network organisations.

The objective of this research is to explore what factors an organization should consider before implementing ICT in a network to become a virtual organization.

1.1 Research purpose

According to Yin (1994) there are three different kinds of research purposes such as exploratory, descriptive and explanatory (causal). In my research I have chosen an exploratory research purpose since I will examine which factors an organisation should be aware of before implementing ICT into a network organisation.

The exploratory research purpose is used when very little has been written about a problem. The researcher starts by finding out which aspects will fit into the research problem area and which aspects are the most important and interesting, as well as which connections that exist between different parts of the problem. The result of the study is composed of a conclusion of aspects of the problem, which is considered essential to further work with. (Winter, 1992)

In this study, I have applied an exploratory problem formulation and the research purpose of this study is: Which factors should an organization consider before implementing ICT in a network organization?

1.2 Disposition of the thesis

This thesis consists of six chapters. In this first chapter, an introduction to the research area has been given, and the research purpose and research questions have been stated. In the next chapter, the methodology used for this thesis will be discussed, while the theory will be presented in chapter three. In the fourth chapter, the empirical study will be presented. An analysis and discussion of the empirical result will be presented in chapter five. Finally, my conclusions and suggestions for further research are given in the sixth and last chapter.

2 Methodology

In this chapter I will present the research methodology I have used for my study. The methodology consists of research approach, research strategy, data collection and finally the method of analysis.

2.1 Research Approach

For this research I have chosen a hermeneutic and qualitative method since I will explore what factors are important for an organisation to consider before implementing ICT.

2.1.1 Hermeneutic

According to Bleicher (1980), hermeneutics can be treated as both an underlying philosophy and a specific mode of analysis. As a philosophical approach to human understanding, it provides the philosophical platform for interpretation.

"Interpretation, in the sense relevant to hermeneutics, is an attempt to make clear, to make sense of an object of study. This object must, therefore, be a text, or a text-analogue, which in some way is confused, incomplete, cloudy, seemingly contradictory - in one way or another, unclear. The interpretation aims to bring to light an underlying coherence or sense". (Taylor, 1976, p.153)

Moreover, Gadamer (1976) suggests that the idea of a hermeneutic circle refers to the dialectic between the understanding of the text as a whole and the interpretation of its parts, in which descriptions are guided by anticipated explanations. According to Radnitzky (1970), hermeneutics is primarily concerned with the *meaning* of a text or text-analogue (an example of a text-analogue is an organization, which the researcher comes to understand through oral or written text).

I have examined a network organisation called BIFUN that is in the process of implementing an ICT platform to become a virtual organisation. The network communicates and coordinates their work today mainly through face-to-face communication, telephone and post. I believe that a hermeneutic approach will help me to make sense of BIFUN as a text-analogue. In an organization, people (e.g. different stakeholders) can have confused, incomplete, cloudy and contradictory views on many issues. The aim of my hermeneutic approach becomes one of trying to make sense of the whole, and the relationship between people, the organization, and information technology.

I have adopted a hermeneutic approach in my thesis because I aim to gain a deeper understanding of BIFUN and its corporate companies. In addition, I considered hermeneutic approach to be the most appropriate for my research since my research purpose is strictly exploratory.

2.1.2 Qualitative Method

This research is based on a qualitative approach because I aim to gain a deeper understanding of why a network organization, implement ICT in its organization, and what factors management must be aware of before implementing ICT. In order to achieve the aim of this study a qualitative approach was considered most appropriate to get a deeper understanding for the interviewees that I have chosen to examine in my empirical study.

A qualitative approach allows the researcher to describe the individual case more thoroughly, where the aim is not to generalize. As the researcher is familiar with the circumstances around the

research object, an understanding of why the particular situation arose will be reached. This knowledge will help to accomplish an appropriate action. In qualitative research it is preferred to use several methods such as interviews, observations and inquiries, so that the research object can be viewed from different angles. Critics of the qualitative approach claim the research to be subjective, that is, the results are too dependent on who the researcher is and may therefore not create a truthful picture of reality. (Johansson & Svedner, 1998) I found the critic partially right since it is hard to get a non-subjective result. What a researcher have in their "backpack" from their earlier life, personal experience, obviously influence the result, but I think the result also depends on how the research have been done. One must look at how the material has been collected, how the interviews have been done, which questions have been asked, and so on. From that point of view, the result of the research is always subjective.

2.1.3 Literature study

After I decided the subject and research purpose for my study, I realized that I needed a larger knowledge about both what a virtual and a network organization really were, and what kind of activity was involved. I found all theories about these subjects from scientific articles by using the database Emerald and EBSCO from the library at Luleå technical university. I was searching for the following words: "virtual organisation" and "network organisation." In earlier written essays, about network organisations or virtual organisations, I found suitable sources and references that could be used in my study.

Besides knowledge about network organisations and virtual organisations, I also had to obtain more knowledge about why organisations and companies implement information technology and people's attitude toward ICT in different situations. I was curious if I could find some previously written literature about factors that should be considered before implementing new technique. These theories have I found in books, them as well from the library at Luleå Technical University.

2.1.4 Sample Selection

When I choose my respondents I have followed Trost's (1997) recommendation. He considers that it is usually uninteresting with, in a statistical meaning, a representative choice in most cases of qualitative studies. The problem with them could instead be that they give us too many "ordinary" people and too few numbers of the more unusual ones. One ambition, in qualitative studies, is to have as much of a variation as possible and not a great number of similar ones. The choice should be so heterogeneous that within a given frame; there should be variation but not so much that a single person is extreme or "deviant".

According to Holme & Solvang (1991) is it important, in qualitative studies, to get in contact with the right respondents since the purpose is to increase the information value and make a base for deeper and more complete understandings about the topics that is studying. If not, the research may turnout to be invalid or worthless. (Ibid) I have chosen to carry out my research in an organisation called BIFUN due to three reasons. Firstly, BIFUN is a network organization that works as a platform for strategic development and assists with the strategic work of developing supplying basic industry companies. Secondly, BIFUN has a plan to start an ICT- project that will lead to a common ICT-platform. Finally, BIFUN is a relatively large organization with 30 members operating in Sweden, and its head office is situated in Luleå. Therefore, I initially contacted BIFUN to find the right companies, which I accomplished by interviewing BIFUN´s director. This first probing resulted in all the thirty company names within BIFUN but I only contacted and made interview appointments with the chief of BIFUN and four of the companies since I assume that it is sufficient to get a reliable result.

To be able to get as good foundation as possible I have made a selection of four companies within BIFUN's organisation that have different business areas, different employees and are located in different regions. I made this selection in order to have different perspectives since I assume that the answers on the interviews will be different for small and big companies, between companies with different work occupations, between companies with different levels of education and understanding of IT, and between companies in different regions.

Enderud (in Home & Solvang, 1991) says that it is important to think of the interviewees ability to express themselves and their willingness to participate when you make your selection since a qualitative interview process often leads to things of very private character. To get as good research as possible I called the companies that I had selected and asked them if I could make a telephone interview with them at a later occasion. The companies had the chance to ask me questions about the topics and decide if they would like to attend the interview. In that way I got companies that were willing to take part and became absorbed in the research and I hope it have resulted in the most exhaustive answer.

2.2 Data Collection

Eriksson and Wiedersheim-Paul (1999) state that when gathering data the researcher can either collect new data by himself/herself, so called primary data, or use secondary data, which is material that someone else has gathered for his/her own purpose. According to Yin (1994), no single source has a complete advantage over all the others. Yin (1994) further states that a combination of these is often necessary to receive the desired information.

In this research I have only used primary data since I haven't found any material that someone else has done within the same subject field. The primary data that I have used in my research are documents and interviews. From the documents I got an overview of the organisation and its members but the most relevant information for my research I acquired during the interviews with the chief of BIFUN and the four company members.

2.2.1 Interviews

According to Yin (1994), interviews focus directly on the case study topic. Holme and Solvang (1991) states that interviews bring flexibility and closeness to respondents that are important in qualitative studies. In addition, interviews make it possible to collect in depth information and for the interviewer to follow up on questions (Eriksson & Wiedersheim-Paul, 1997). Interviews also make it possible to focus directly on the case study topic and the collection of non-essential data is thereby minimized (Ibid).

Yin (1994) states that there are three forms of case study interviews; open-ended, focused and structured. According to Yin, in open-ended interviews, respondents can be asked for both facts and their personal opinion. In focused interviews the interviewees are interviewed for a short period of time. Yin (1994) further states that a focused interview might still remain open-ended, but are more likely to follow a certain set of questions derived from the case study protocol. The structured interview is more structured along the lines of a formal survey. I decided to do my interviews open-ended since I would like to have the respondents' personal opinion in most questions but in some questions I would like to have facts. I believe that by using open-ended questions the interviewee can speak freely with his own words and I get more reliable information in this way then by having predefined answers to the questions which probably doesn't fit the respondent.

When I thought of how many interviews I had to do to get a good foundation of my research, I followed Trost's (1997) recommendations. He considers that you should limit the number of interviews to maybe four or five of them. If you have too many interviews the body of information becomes cumbersome and you can not get an overview and at the same time see all the important details that unite or distinguish. Trost emphasizes that it is important to recall that a minority of well performed interviews is much more worth than a majority of less well performed ones.

According Ekholm & Fransson (1976) the first step planning the interview, for me as an interviewer, must always be to identify the main question and clarify what I am interested in and what I should use the interview result for. In the beginning, one need to inform the respondents about the purpose of the interview, clarify what demands exist for the answers, and how to exchange the result between the persons involved. Apart from that, it is necessary to introduce one self to the respondents, who you are and were you come from. One must always explain how the information will be treated and by whom it will be used. The interviewed person should be appreciated, at least at the end of the interview, and this could lead to positive effects on future interactions with the interviewee. The last part of the interview is in most cases the part that the interviewed person remembers best and therefore it's necessary that the content of this part have a positive effect.

In general, it's the interviewer who takes the initiative to the interview. After the interviewer have prepared him/herself in different ways he/she will contact the respondent to agree on a contract which involve purpose, issues, extent, time and place, rights and possible fee and publishing. Then the interviewer prepares himself for the interview. During the interview the interviewer presents the planned questions. He controls the dialogue and tries to get the main themes illustrated. Once the interview is completed, the interviewer interprets and estimates the result of the interview. After this the result will be edited, which involves applying structure to the interview, suitable to its context (Jacobsen, 1993). With Ekholm & Fransson (1976) and Jacobsen (1993) recommendations in the back of my mind, I planned the interview questions on the basis of my research purpose. When I called the interviewees I first presented myself and explained why I was calling them. Then I asked them if they were willing to take part an interview. The persons that were willing to answer my interview questions, by a later agreed occasion, were very compliant. When I had revealed all the questions in my questionnaire, I asked them if they were wondering about something or if they had something else they wanted to tell me about the subject. To my surprise, all interviewees had something more to say about the topics, both negative and positive things. I end the interviews by thanking the respondents for answering my questions and for letting me occupy their time. I think and hope that this is a positive ending of an interview.

Eriksson & Wiederheim-Paul (1997) state that interviews can be performed in person or by telephone or another media. According to the authors, the advantage of a personal interview is that the researcher can use complicated questions, make visible illustrations and non-verbal language can be observed. Personal interviews are, on the other hand, more costly and time consuming than telephone interviews (Ibid). In this research I have used both personal and telephone interviews. I consider that "another media", as Eriksson & Wiederheim says, could be a questionnaire. I have chosen not to use a questionnaire since I thought that the answers would be too short and not correct, making them too hard to analyze. It can be difficult for the respondents to answer honestly when there is no one to give them a direct, personal question. When you answer a questionnaire it is not always you can find an alternative answer that fits you personally. If there are too many options that don't feel right, the respondent probably becomes unengaged to the whole questionnaire and that will result in a hasty answer and a bad final result for those who examine the result.

Personal interview
The best method for an interview is face-to-face since the interviewer can "read" the interview with all theirs senses. There is a lot to understand that is not always told directly by words from the respondent. If the respondent does not understand what you mean by a specific question you got the chance to reformulate it immediately so it becomes more understandable. A face-to-face interview can also lead to better engagement and more carefully prepared answers then you get from someone that you don't have any personal contact with. The greatest advantage with a face-to-face interview is that you can get more information than from a questionnaire since you can follow up the questions immediately to get a more complete answer. It becomes easier to sit down and talk more about every question and the respondent thinks of more information to each question. (Jacobsen, 1993)

I considered that the best way to do an interview was to have a personal interview face-to-face with the respondent since it is easier to do an interview when you can immediately see if the respondent doesn't understand what you mean. Then you have the opportunity to ask the question again in another way or help them by giving an example. My wish was to make personal interviews with all respondents but that wasn't possible since they are active on different places in Norrbotten. Thus I did only one personal interview and that was with BIFUN's director at his office in Luleå. I agree with Jacobsen that the greatest advantage with a face-to-face interview, is that you can get more information since you are able to follow up questions immediately with the respondent to get a more complete answer. I believe that during a personal interview the respondent feels more chosen and important, resulting in the respondents giving more of his/her time to answer correctly and comprehensively than they would have answering a questionnaire. Another reason to why I decided to do a personal interview was that then I could make a time reservation with the respondent giving myself more control of when I would be finished with all interviews.

Telephone interviews
Of course it's of importance for the interview if one meets face-to-face or if one speaks over the phone. According to Jacobsen (1993) there are factors that are associated with telephone interviews that should be clarified. A telephone interview isn't the same as a face-to-face interview. It's easier for the respondent to escape the interview through different excuses if it is telephone based. The most important is probably the loss of body language, which in most cases says something else than the spoken word. Different persons have an easier or harder time to speak on the telephone. Some are silent when others speak better over the telephone than face-to-face with another person.

I have made telephone interviews with the four companies within BIFUN. Since I didn't have the ability to do personal interview face-to-face, because the companies are in different place in Norrrbotten, I thought that the best alternative would be personal interview by telephone. It is better to make a telephone interview than to send a questionnaire since when you have made a time reservation with a respondent then you have made an agreement. I think it is easier to forget to return a questionnaire than to break an agreement. Another reason to why a telephone interview is better than a questionnaire is that the respondents get shorter answer if they must write it down instead of speaking freely about a subject since it can be both difficult to write about feelings and tiring to write long answer.

Register the answers
Which technique to choose to register the answers is fully dependent on the characteristics of the information and what the interviewer prefers. It's demanding to talk, listen and take notes simultaneously and one can loose some of the content in the interview. Taking notes also has the

negative effect that the interviewed person will notice the parts that the interviewer has special interest in (Jacobsen, 1993). The tape recorder is of course an invaluable tool for registering the answers of the interview. One can then analyze the information after the interview in a calm fashion and take notes of the most essential parts. One disadvantage to this method is that it can be inhibiting to the person interviewed. Another disadvantage is that this method demands extensive work afterwards. The compilation of an interview report should be done as soon as possible after the interview. This is because forgetfulness is at its peak just after we have learned something new, and the memory is an active reconstruction process where we with the lead of some grounds make a decision of how it have to be. The perfect method to register the answers of an interview doesn't exist. Advantages and disadvantages exist for all techniques to register an interview (Ekholm & Fransson, 1976).

To avoid missing important information I have chosen to use a tape recorder during the interviews. This way I can concentrate and focus on the respondent and the interview runs more smoothly with less breaks. Furthermore, there will be less misunderstanding since I can rewind the tape and listen as many times as I need.

2.3 Method of analysis

During the analyzing I followed Trost's (1997) outlines where he says that doing all the analysis during or directly after the interview is not recommended since one need distance to the interview to be able to analyse it in a reasonable way. Further he says that the advantages of using a tape recorder during an interview are that instead of taking lots of notes ones can concentrate on the questions and the answer the respondent give. The interviewer also has the ability to listen to the tape repeated times. According to Trost (1997) there are different ways to work with a material which are recorded on tape: write down the tape in extenso or listen to the tape, write down some memory notes and then write a summary of each interview. The last method has the benefit of being able to eliminate all uninteresting material, all the unessential things that have nothing to do with the study.

I haven't done all analysis work during or directly after the interviews since I needed the discussed distance from the interviews to think and compose my thoughts before I could analyze the material. During the interviews I used a tape recorder to have the ability to work on the body of information as many times as its needs. I have the material from the recorded interviews in two ways where the first way was to write down the tape in extenso. This resulted in many pages and maybe the body of information lost the general view which it must have to be analyzed. The other way was to listen to the tape, write down some memory notes and then write a summary of each interview. This resulted in these interviews becoming easier to analyze.

To analyse case study evidence is, according to Yin (1994), one of the least developed and most difficult aspects of doing case studies. Too many times, investigators start case studies without having the any idea about how the evidence is to be analyzed. Such investigations easily become stalled at the analytical stage not knowing what to do with the evidence. To not get stuck at the analytical stage I used a general strategy by Yin (1994) called *Relying on theoretical propositions*. I analysed the case study by following the theoretical proposition that led to the case study. Since I examined how to transform a network organisation into a virtual organisation I was interested in theories that discuss network- and virtual organisations, companies' perspectives about IT, reasons to implement it and different factors to be considered before implementing new IT into companies and organisations. Further, abundant and direct information, defence mechanisms, and finally different dimensions of experiences' quality by innovation. The only theory I couldn't analyse and get a result from was the one about companies' perspectives about IT. I found that

this theory doesn't correspond well with my research since I have another view of the definitions "small and large companies", "big city regions and smaller region". I haven't found any definitions of "big city regions and smaller region" but now I know that a big company, according to EU, have more then 250 employees and a small one between 10 and 49.
According to Yin the original objectives and design of the case study are presumably based on such a proposition, which in turn reflected a set of research questions, reviewed the literature, and new insights. The propositions help to focus on certain data, to ignore other data and to organize the entire case study and finally to define alternative explanations to be examined. In my research I got both answers that had nothing to do with my research and others that I could work further with. From the answers that were relevant for my research, some theoretical propositions agreed very well while some didn't and in both ways I have try to examine an explanation.

2.4 Validity and Reliability

Validity means, according to Trost (1997) that the questions shall measure what it's intended to measure. Further he says that this is important to be aware of when a qualitative interview is being done, since the interviewer strive to know what the respondents intend or how he/she understand a word or an occurrence.

To improve the validity, so the questions really measure what they're supposed to measure, I ensured the questions agreed with the theory, purpose and research questions. I recognized that there must be a link between the question and the theory since I was going to use the theory when analyzing the interview answers. To increase the validity further I allowed my supervisor to check the interview guide before conducting the interview to get an objective opinion. Since I would like to understand how the respondents interpreted by my questions, I used open questions to give the respondents the opportunity to answer without any interference.

Trost (1997) says that a reliable measurement should give the same result by a renewed measurement. By a research, must all interviewers ask the respondents in a same way and the interview situation shall be the same for all.

I have followed Trost's three components of reliability:

1. Congruence: There must be a likeness between the questions and the questions that measure the same thing.
2. Precision: The interviewer's way to register. If they register the same thing, the objectivity is high.
3. Constants: An aspect about time, it assumes that the phenomenon or the attitude doesn't change.

To make the readers rely on my research I made an effort to decrease the probability of interview bias. First, I tried to design the interview questions in such a way that all respondents would find it easy to understand and because of this I could ask all respondents the questions in the same way.

To make the precision high I have used a tape recorder so the reliability can be improved, since every answer is recorded and can be listened to afterwards. The tape represented additional and more accurate notes to ease my interpretation of the empirical evidence.

It's hard to know if the last component, constant, is fulfilled. I'm convinced that all interviewees would give me the same answer if I had redid the interviews immediately, but I cant promise that

they would give me the same answers after a week or two. In a week, an employee would have had time to get new information about the subject that could change ones view.

3 Theory

This chapter aims at developing a theoretical framework for my study. It starts with my explanation of what a network organization is followed by my view of the concept "virtual organisation" to give you a basic explanation of the subject. Then I explore the component entities of virtual organisations, where ICT is the most important ones, followed by Companies' perspectives about information technology. These perspectives exist since companies are of different size, situated in different regions and have different areas of business. Further, I present different Reasons to implement information technology into companies and organisations and finally I present the Factors to be considered before implementation of new technique.

The difference between a network organisation and a virtual organisation is hard to explain since there is no exact definition for either of them. I separate a virtual organisation from a network organisations if they communicate and co-ordinate their work through information technology instead of face-to-face, if ICT is seen as a key element in supporting this organisational transformation with systems that facilitate coordination and communication, if they share knowledge and make decisions over the web and finally, if it isn't necessary that the employees have similar cultural and national backgrounds and are working in a same room.

3.1 Network Organisations

According to my definition network organisations are small and medium-sized companies that organize themselves and communicate and coordinate their work through face-to-face communication, telephone, post and fax.

The notion of a network implies nodes and links. The nodes can be people, teams or even organizations - networks operate at many levels. Common examples are distributed geographic teams in large organizations, or small organizations operating as networks to compete against large corporations. The links are the various coordination and "agreement" mechanisms. (Hastings, 1993)

According to Jacobsen & Thorsvik (1998) many organizations are less self-supporting of resources and must cooperate with other companies to reach their goals. The capacity to create a network by collaboration organization became a really important competition advantage for an organization. A network organization has titles that identify an individual's place in the organizational hierarchy. Formal communication facilitates downward transmission of orders and upward transmission of information. Work revolves around a particular job description that takes place in a particular space, e.g., office in a particular building, street, town or state. The reward system is built around longevity.

Dalsgaard & Bendix (1998) says that within all forms of network, people can't spare, in good or bad, mutual contact since they are dependent of each other. What you reach together is better than what you can reach by yourself. I think this can be a good reason to join some form of network.

3.2 Virtual Organisation

The background of the concept 'Virtual Organization' dates back to the 80's groupware Technologies (Baecker in Vartiainen 1991), and to the resulting discussion on telework, and on visions of virtual corporations (Davidow & Mallone 1992, Byrne 1993). Multi-site, multi-organizational and dynamic organizations began to appear in the 1970s (Snow, Lipnack & Stamps 1999). In the middle of 90's, the first empirical studies were done to understand the nature of virtual organizations and working (Vartiainen, 1991). Virtual organizations are seen as the

emerging standard in business, resulting from technological advances and changing expectations on the part of consumers and collaborators. Authors such as Goldman, Nagel & Preiss (1995) and Davidow & Malone (1992) argue that virtual corporations are here to stay. With information processing and telecommunications networks continuing to expand, corporations that use these technologies to their full potential will succeed, and in the process raise the standard for competition higher than traditional forms of organization can achieve (Preston, 1991).

In order to understand the real meaning of this concept (virtual organisation), many authors have suggested different definitions. According to Ahuja, M.K. & Carley, K.M. (1998), a virtual organisation is a geographically distributed organisation whose members are bound by a long-term common interest or goal, and who communicate and coordinate their work through information technology. In addition, Robbins (2001) defines a virtual organisation as a small, core organisation that out sources major business functions. In structural terms, the virtual organisation is highly centralised, with little or no departmentalisation.

According to DeSanctis & Monge (in Saabeel et al.), a virtual organization is a collection of geographically distributed, functionally and/or culturally diverse entities that are linked by electronic forms of communication and rely on lateral, dynamic relationships for coordination. Despite its diffuse nature, a common identity holds the organization together in the minds of members, customers, or other constituents. The virtual organization is often described as one that is replete with external ties (Coyle & Schnarr in Saabeel et al.), managed via teams that are assembled and disassembled according to need (Grenier & Metes, in Saabeel et al.; Lipnack & Stamps 1997), and consisting of employees who are physically dispersed from one another (Clancy; Barner in Saabeel et al.).

Vartiainen (1991) points out that a virtual organisation's aim is to provide an organisational solution to problems posed by the uncertainties arising from increasingly intense global competition. Along with increasing reliance on ICT, the idea of the virtual organisation emphasises the decentralisation of control, the creation of more flexible patterns of working, a greater empowerment of the workforce, the displacement of hierarchy by team working, the development of a greater sense of collective responsibility and the creation of more collaborative relationships among co-workers. ICT is seen as an essential element in supporting this organisational transformation, especially to systems that facilitate coordination and communication, decision-making and the sharing of knowledge, skills and resources.

"Virtual organizations are often characterized with three dimensions: space (same place – dispersed), time (synchronous – asynchronous) and mode of interaction (face-to-face – electrical). Individual diversity (similar – different) could be the fourth dimension. In a non-virtual organization, employees similar in their cultural and national background are working in the same room, at the same time, and communicating face-to-face (Vartiainen, 1991). In virtual organisations, employees work geographically dispersed, often asynchronously and are linked with each other by using various communication technologies. People involved may speak several languages and have diverse cultural, educational and vocational backgrounds. This brings along a strong cultural emphasis. Thus the virtual organization challenges the traditional working here and now, and communicating face-to-face. In order to overcome temporal, spatial and organizational disablers, ICT is utilized both as means of communication and as a collective memory (Vartiainen, 1991)".

3.3 Companies perspectives about information technology

There are many reasons to why different companies accept ICT and how they use it. The alternatives I present below are the theories that are related to the areas of the assumptions I did when I structured the interview questions.

An observation of Lind, Zmud and Fiscker (in NUTEK, 1999) state that larger organisations has a superior variation grade in information and a larger organizing loose. Because of that they are more inclined to use information technique. Another reason why smaller companies are less willing to use information technique is that they lack financing for that type of investment (Doudikis, Smithson, Lybereas; Crag & King; Montazemi in NUTEK, 1999).

The education level of a company will influence the grade of using information technique. The higher the education level is among the management and employees, the higher the willingness is to use information technical applications. (Stockman & Dokter in NUTEK, 1999)

There are differences in the way information technique is used between big city region and smaller region, and it shows that the use is more highly developed in bigger cities. The problem is the fact that there is a concentration of companies with a passive approach to information techniques in the smaller regions. There is no natural connection between using the information techniques and a continuous development of the businesses. (NUTEK, 1999)

3.4 Reason to implement information technology into companies and organisations

According to Dabinett & Graham (in NUTEK, 1999), it's not unusual that the first introduction of information technology in small-sized companies happens on the initiatives of the bigger companies. When information technology is used internally it is to support communication channels and processes, which by itself is used in organizing activities as well as carrying out the activities. Kreps (in Nutek, 1994) further suggests that internal communication channels are usually used for four basic purposes, which are:

- To spread and support goals, rules and formal procedure within organizations.
- To coordinate activities in order to carry out the organization's assignments.
- To supply information to the management about the present situation in the organization's activities and also to check if the instructions are correct.
- To socialize the organizations members in the organizations culture.

Due to the high competition among small-sized companies, the interest in information technology is enormous because information technology has a significant role in a competitive situation. A usual perception is that the increasing competition gives rise to an increasing demand, both quantitative and qualitative in timing.

Porter & Millar (in Daniels, 1995 p. 15) states that the information revolution is affecting the nature of competition in three vital ways:

- It changes industry structure and alters the rules of competition by increasing the power of buyers, raising barriers to entry, and influencing the threat of substitution.
- It creates competitive advantage by giving companies new ways to out-perform their rivals by lowering costs, enhancing differentiation and changing competitive scope.

- It spawns whole new businesses, often from within a company's existing operations by making new businesses technologically feasible, creating derived demand for new products and creating new businesses within old ones.

According to Daniels (1995), the major task in the first phase of implementation is to spell out how the businesses operate today, how they will operate tomorrow and the factors that can eliminate the distance between them. By analyzing the role of ICT, the people involved in the implementation can see first hand the reasons for using ICT to help restructure the business processes. They will also determine the organizational changes needed to take the company forward. Once people understand that they are determining the company's future business practices and that the process requires their expertise, commitment will be high; participants like to be actively involved in new project. That means involving key decision-makers in the design of ICT systems is necessary to ensure that all shareholders understand the advantages to be gained with ICT.

Furthermore, it is essential to keep people fully informed about the timing of different stages of implementation. According to Daniels (1995), there is a danger if people are not kept informed about the timing of different stages of implementation. People may begin to think that full implementation will take place sooner than it actually will. The business and ICT managers should work together to develop a realistic timetable that describes the phased implementation of the process and system. This should be available to anyone who communicates about the project through the formal communication systems.

Daniels (1995) suggests that the question below needs to be posed and addressed during implementation stage because implementation is closely linked to education and training in most companies; few employees know a great deal about it.
What level of understanding about the technology do business managers in your company need to have? What level do they have?

In addition, to identify competitive information system needs accurately; executives and managers look at the key events that occur in the business process. Information that may be of competitive value is associated with these key events of the business. By tracking this information, management can more precisely decide on the actions to take. (Daniels 1995) Finally, she further points out that it is important to know the current state of the communication infrastructure in the company and if there are any information barriers among the key business cycles. She points out that by focusing and identifying the key points of events in a business and defining the information of a value about these events, managers build a set of performances measures and monitor systems about a company's key business process.

3.5 Factors to be considered before a implementation of new technique.

According to Angelöw (1991) employees are often negative or resistant toward organizational change. That is logical since most organizational changes are micro-managed and the employees became presented with a pre-packed measures, which they had no ability to influence. To ensure that the implementation of new technology not be a wasted effort or irrelevant, I think one should be conscious of the factors that lead to why people would like to use and take IT to their heart, and those should be illuminated before an implementation since it is an expensive investment. Angelöw (1991) says that the employees' experience and competence became the most important means in the good work of change. Changing measure that builds on participation, security, abundant and direct information, and mutual confidence are often usually welcome and are seen

as positive. Accoring to Norén (1987) is the implementation a very sensitive phase. A source of problem is these expectations that above all the management have at the result of the investigation. If the technique have an expectation to solve quite simple problem in the organisation the company will have a quite high aim, but the company can not use the potential of the technique to the full. If the demands of solved problem are high the aim will be for a short sight low but the potential of the technique can in a longer view be using better. At short sight, the low aim will cause insecurity in the organisation.

3.5.1 Abundant and direct information

Angelöw (1991) says that individual often would like to have direct information about coming changes. To hear about changes through second-hand information or rumours will lead to distortion and cause resistance which is an obstacle for the good changing work. This could be prevented through abundant and direct information since rumours arise because of lack of information and through misconstrue of a message. Especially in trying situations, like an organizational change, is there a large risk that messages will be misconstrued and misunderstood and we became stressed. In organizations where colleagues aren't involved and participating in the initial period of the changing process, rumours are thriving.

3.5.2 Defence mechanism

According to Angelöw (1991) a person's energy will be used to defend oneself if he/she perceives a waiting change as threatening. A threatening situation doesn't have to imply that it is a danger for life, it can also mean a situation where one's freedom or one's working situation is threatened. Aggression can be a defence in a threatening situation according to Angelöw (1991) and it doesn't have to be about an ordinary and naturally anger; it can be an exaggerated and sometimes an unexplainable aggressiveness. If a change could be apprehended as positive or relevant, the individuals' energy could be used for constructive activity.

3.5.3 Three dimensions of the experience quality by an innovation

Despite the fact that it can be complex, it is necessary to understand the quality of experience of information technique to give a composed picture of the concept that rules and influences the motive for using the technique. (NUTEK, 1999)

There are five dimensions of the experience quality by an innovation: Relative advantage, Compatibility, Complexity, Testable and Observation. (Rogers in NUTEK, 1999). In this report I will only discuss relative advantage, compatibility and complexity since only those are relevant in this research.

The other two dimensions, testable and observation are about the characteristics that one experience from the innovation of new technique. Testability refers to the possibility of testing and evaluating a technical solution before purchasing. Observation means how one experiences the possibilities to discover the properties of the technical solutions beforehand. These dimensions become relevant when one has already decided to carry out implementation of ICT and we will not go into that subject area.

Relative advantage
Relative advantage is the experienced advantage of information techniques towards other solutions of the companies' communication problems. It is important to note that relative advantage has qualities that cannot be established as objective, it is dependent of the individual evaluation. It also involves the advantage that information techniques are dependent of the situation the techniques will be used in, if applied appropriately.

Compatibility
Compatibility means the experienced agreement between the new techniques and existing work routines, norms and values by the user. A frequently recurring result in earlier research is that a high grade of compatibility influences the spread of new techniques and innovations positively. (Cooper & Zmud in NUTEK, 1999)

Just like relative advantage, compatibility has a subjective valuation of the technique in relation to the situation.

Ramiller (in NUTEK, 1999) have designed a set of dimensions to give a more detailed picture of the conception compatibility. The conception contains five different dimensions: Suitable, Knowledge and control, Experience and professionalism, The Managements influence and response and finally Change support.

- *Suitable:* Describes the final users understanding of the techniques' suitability to support work routines.
- *Knowledge and control:* Reflects the knowledge about the innovation that will influence the final user's experienced possibility to keep control of their own work situation. This factor is in a way related to and hard to divorce from next factor.
- *Experience and professionalism:* Contains qualities in the work situation like autonomy, creativity and variation and high valued properties like prestige and quality of work.
- *The Managements influence and response:* Addresses the experienced challenge of technique against the pronounced norm system and the consequences it has for the management's way to handle the situations.
- *Change support:* A factor that describes the expected support from the organisation during the process of change following an introduction of new technique. (Ramiller in NUTEK, 1999)

Knowledge and experience are naturally central conceptions since a value of agreement demand knowledge about the technique. Knowledge about information technique has shown to be an important motive behind the introduction of information technique in small business.
(Thorn & Yap in NUTEK, 1999)

Complexity
Complexity is the experienced difficulties to understand and use the information technique in the company. The actual level of knowledge is naturally interesting and so is any experience the decision-maker has from previous usage. Experienced complexity has in earlier research shown to be strongly correlated to earlier experiences of usage of information technique. (Cale & Eriksen; Pennings & Hariato: Montazemi in NUTEK, 1999)

A natural way to reduce the complexity is to raise the level of knowledge by education and counselling.

4 Empirical and the result of the research

In this chapter, the empirical findings from the data collection will be presented. Brief company backgrounds of BIFUN and the four members of BIFUN's organization will be introduced, followed by how the interview was structured, as well as the interview questions and answers.

4.1 Company presentation

The general organisation BIFUN

The base industries in the North: the wood, paper, ore-and steel industries have a meaningful role for the region's trade and industry. In 1998, since three out of four engineering companies have base industries as their major customers, SAF and LO started a development project called BIFUN – "*Supplier of the Basic Industry Development in Norrbotten"*. BIFUN´s organisation objective is to give the subcontractors a competitive power in the market and to reduce their dependence on the customers within the basic industry. It is necessary for the subcontractors, i.e. the companies within BIFUN, to have other customers than the basic industry in case the basic industry doesn't want their products or help one day.

Since January 2001, BIFUN runs as an economic association, the members and stakeholders are the suppliers for basic industry companies. BIFUN works as a platform for strategic development and assists with the strategic work with the purpose of developing suppliers to basic industries companies. The major business areas that are intended are business operation, competence and technique. (BIFUN's web site, 2003) Furthermore, BIFUN aims to increase the occupation and create a safe work environment for the employees. Finally, BIFUN´s manager Anders Wäppling says that "a project with a gradually increasing contribution of qualified suppliers to basic industries companies with development possibilities shall strengthen the competition and guarantee a positive development of the companies". BIFUN's head office is situated in Luleå but the members operate all over Sweden.

Today BIFUN's members communicate and coordinate their work mainly through face-to-face communication, telephone and mail but BIFUN's manager has a plan to start an ICT- project that will lead to a common ICT-platform for all members. The reasons to implement a common platform are to raise the companies' competence, speed up their development, give them an upper hand in competitive situations and increase their earnings.

The four companies of BIFUN

Besides an interview with BIFUNs director I interviewed four companies which are members of BIFUNs organisation. Since the companies wish to be anonymous I name them as A, B, C and D. The companies have different business areas, they operate in different geographical areas and they have different numbers of employees. Two of the companies are working within the metal and steel business while the other two companies are in the consulting business where they develop different techniques mainly directed towards the industries. Tree of four companies have made large investment in computers and therefore have a great knowledge in computer system. The same companies also say that they have further education for their employees.

4.2 Interview with BIFUN´s director

Expectations and outcome of BIFUN

BIFUN's VD considers BIFUN to be a network organisation. This network consists of companies that establish a temporary cluster between themselves to be able to submit an offer and deliver an object. To be a virtual organisation, he thinks that the business alignment has to be much more focused and clear. The purpose with BIFUN is to keep these contacts and the means of

communication open between the companies in the network, kind of a uniting function. In the future BIFUN, as an economic association, will be taking over of IUC Barents Corporation. BIFUN's VD hopes that the network will remain and a support for that is maybe such an ICT project like this.

Implementation
In regards to how the implementation process will work, the VD answers that they have a parallel IT-project in a tree company that they could use as a model. In that ICT-project there is a "smorgasbord" that contains everything from basic education like how to turn on a computer, to more advanced courses like Cad drawing. There is a large choice of education so the individual can choose and conform after his/her own capacity. After the education, BIFUN offers the companies a mentor that helps them to make a conformed ICT plan for their company, go through how the information's structure looks like, and what kind of equipment they need to have. The next step is to make a home page if they believe the company has such a need. If the companies have common cluster, they receive help in building a common home page. BIFUN's VD says that before you start such a project you must begin to have idée seminaries when you make an inquiry by the companies videlicet BIFUN's members.

Advantages and Disadvantages with IT/ICT in organisation
BIFUN's VD thinks that if you get an ICT-project implemented, it will result in the competence being raised in the company; it will speed up the development of the companies, give them an upper hand in competitive situations and in that way increase the earnings. In that regards, ICT is seen as more of a natural daily working aid. The VD doesn't believe that ICT creates any companies, ICT is a communication aid. The aim with this kind of project is above all that the companies will be able to affect their own process, for example by co-operating their productions with help from ICT. Further, he thinks that the objective should be there and if you then obtain side effects in form of communicating in a network it is only positive.

The VD can't say if there is any risk with a technical implementation but a problem that he foresees is that you see the need to teach the personnel more basic knowledge. Today there are many that have education but lack the experienced base knowledge that there is no education for, you have to learn it in a practical way or create that kind of education.

The company and their personnel
The VD sees a problem in the increasing load of e-mails since he thinks that people dosn't have the energy or ability to manage the quantity. He observes that the companies shut off the computers to prioritize their customers instead of answering the mail. However, he doesn't only see disadvantages from an implementation, he also sees advantages. It's advantageous if you can manage the mail so it speeds up the process and sieve away such things that are less important. Today he notices that that there is time to e-mail when the companies receive an answer from a customer or when you can transmit plans between each other.

In the question of what grade of understanding and knowledge about the technology the companies in the organisation have today and needs to have, he thinks that they need fundamental knowledge. Today there is a span that means that some of the companies don't even have a computer and some companies' works with transfer cad-plans, process steering and so on. Further he considers it a problem that the span of the companies' computer skills is so large, but he thinks that you have to customize the education anyway, and that you must work on a fundamental level. BIFUN hasn't considered the specifics on how the personnel in the companies will be affected by an ICT-implementation. Yet they believe it is possible that if you implement it correctly, it could

increase some kind of involvement and more people in the companies would take part in company business.

Information flow and communication
Responding to the question about communications problem within the organisation, BIFUN's VD answers that one problem is that not every company use mail in their daily work. Since they don't have any common ICT platform they can't communicate in an easy way by the web, thus communicating mostly by letters and telephone. Today the VD tries to use e-mail, but it is not reliable that the customers read it. The VD believes that if you want to be certain that the information is reaching the receiver, it should be by post.

BIFUN's VD doesn't believe the internal communication process is working as it should since many employees are still unfamiliar with using a computer and prefer to communicate by telephone or face-to-face. As a result of this, they are now forced to inform the members of the organisation by a newsletter. Presently they give the information during the seminaries and conferences they have arranged. The director hopes that the planned implementation of the common ICT-platform will help the organization to communicate via the web.

The only information barrier he can think of within the general operation is the secrecy policy between every company's members.

4.3 Interviews with the chosen companies in BIFUN

Expectations and outcome of BIFUN
The four companies I interviewed joined BIFUN's organization in order to get a good business contact and to build a network within the base industry. Company A wished beyond the access of a network, wanting to obtain an alternative view on the company from outsiders.

All the companies I interviewed concordantly answered that their contacts and network have increased, which they are all pleased with because these were their reasons of joining BIFUN's organization. Moreover, company A and B further stressed that they have good contact with BIFUN´s manager and the other companies within BIFUN through telephone communication, by taking part at conferences and by exchanging ideas at seminaries. Especially company B regards BIFUN as a good constellation that render lots of valuable help. Company C and D are less pleased of what they have gained from BIFUN except the contacts and they don't have the same frequent contact with BIFUN's management as company A and B. They further stressed the need for the contacts and the cooperation within BIFUN to be improved. Company D expresses that he misses the activities and the information meetings they had before.

Three of four companies regard BIFUN as a network organization while the fourth company regards BIFUN as a virtual organization because of the constellations which are made of interest and needs that later dissolve when the project is finished.

Implementation
Regarding my questions about the implementation of the proposed ICT project that might lead to a common ICT platform for BIFUN's organization, Company A and B said that they have heard and knew a bit of the project and they were very positive towards an implementation. Besides, company B has also contributed ideas to the proposed IT project. Company C and D said that they haven't heard about the project at all and they asked me questions about it and would like to know what an ICT-implementation really means for their company and what would be better for them. Since I had so little information about the proposed implementation I felt that I shouldn't say too

much since I was afraid it would cause distortion and resistance to the purpose. When I asked the questions about the implementation and its advantages and disadvantages, company C and D were very irritated and would hardly answer them. One of the companies had an almost aggressive attitude towards me although I had contacted them beforehand so they knew what the interview would deal with.

Nevertheless, all the interviewees said that they are not aware of how the implementation process will be carried out.

Advantages and Disadvantages with ICT in organisation
When I asked the interviewees about the advantages and disadvantages of implementing ICT in their organization, company A and B answered that they could see advantages such as that it will be easier to contact and work with the customers. Company B expressed that ICT can also be a help when it comes to marketing. Furthermore, company A and B said that they could also see some disadvantages with implementation. Company A believes that the personal contact might be reduced while company B said that it might be dangerous if the needs for ICT are not expressed before carrying out the implementation. On the other hand, company C and D did not see any advantages or disadvantages at all; they mainly want to increase their contact within BIFUN before they can even start such a project. However, company D said that "there are never any disadvantages in implementing any kind of technology".

The company and their personnel
Regarding the questions about the future changes in communication and coordination as a result of implementation of ICT between the companies in the organization, company A and B answered that they believe that communication and coordination will increase; it will be faster and better. In addition, company B also believes that a common ICT platform will tighten co-operation and dialogue. Company C and D do not believe that communication and coordination will change from what they are today. However, company D believes that telephone calls will be clearer and more concise than before, if, for example, one can send a drawing in advance because it is difficult to explain everything over the telephone.

Three of four interviewees don't believe that their company will develop by becoming a virtual organization. However, company B believes that working together increases competitive power which can lead to an organization development and enable them to carry out bigger projects which would not be possible working alone.

The interviewees have the same opinion that none of the companies' employees will be affected by an ICT implementation since they all have computer skills and often work with computers. As a result of this, they believe that they do not require any further understanding and knowledge of the technology. Company B and D consider themselves to have basic computer knowledge while company A and C believe themselves to have high computer knowledge.

Information flow and communication
The interviewees have different perspective regarding the most important information flow in organisation. Company A said that information flow are offers, orders, handling of drawing and economy while company D answered that they have no special information flow. Besides, company B and C think the most important information flow is to make the company visible to the customer. The interviewees have different perspective regarding the term visibility. In addition, company B think it is important to be visible in a common network since you can "show more muscles" while company C prefer to work with customers through database.

Company C and D have the opinion that there are no barriers in the general operation. But company C said that it could have been advantageous if more documents and bills are posted via mail and provided it is properly managed. Moreover, company C expressed that a barrier "is something we take measures against immediately".

Company A and B consider there to be information barriers. Company A thinks that the work could be more effective if everyone in the organisation has a computer. In this context, company B thinks that the traditional way of information, such as a brochure, is expensive, but if one can computerize it then it would be good since the cost reduction is important.

The interviewees have the same communication channel. That means they often communicate through post when sending documents externally, and internally through face-to-face. Finally telephone is mostly used for communication in this organisation.

4.4 Internal and external communication infrastructure

In order to be sure of the communication infrastructure of BIFUN, I sent an evaluation table to all my interviewees and the result from this evaluation is presented below.

Communication Channels	**When/Which communication channel do you prefer to use in communicating with others?**	**When/how do others communicate with you?**	**The general way; how you communicate with others within BIFUN (Scale 1-7, in which 1 is the most frequent).**
4.4.1.1 Face-to-face	First contact with customers	First contact with customers	1
4.4.1.2 Telephone	Informal discussion and information to the customers	Informal discussion with customers, first contact with salesmen	2
4.4.1.3 E-mail	Distribution of documents, confirmation of information, etc	Distribution of documents, confirmation of information, etc	3
4.4.1.4 Fax	Short messages, send forms and signatures	Short messages, send forms and signatures	5
First Class conference system	----------	----------	-
4.4.1.5 Web CT	----------	----------	-
4.4.1.6 SMS	----------	----------	- (Private use only)
4.4.1.7 Video conference	With customers in other cities	With customers in other cities	7
Telephone conference	With customers	With customers	6
4.4.1.8 Letter	Formal order from and to customer, commercial, etc	Formal order from and to customer, commercial, etc	4
4.4.1.9 Other	----------	----------	
4.4.1.10 Other	----------	----------	

Figure 2. Evaluation table

This evaluation will be analyzed under the heading Use the same way of communication.

5 Analysis and discussions

In this chapter I will discuss the result of the theories and my analysis, and explain why BIFUN is doing the implementation. Further I analyze the findings from each category in the empirical study and compare them to the theories that have guided my research. After analyzing, I will present my results and explore them further in the next chapter's conclusions. But I will by telling if the assumptions I had, when I structured the interview questions, were right and if they emerge in the answer.

5.1 My Assumptions

When I planned the interview questions I thought the answers would more distinguished, not only because there were different people, but because of the assumptions I had before I did the interviews. My first assumption was that a large company was more inclined to use IT instead of a small one. My thoughts were that maybe a small company haven't got enough money to invest the latest IT. Another explanation was that if the company have few employees they may think it is meaningless to use IT as a communication mean. When I thought of company sizes, I thought a small company had less then 10 employees while a large company had more then 30 but unfortunately those definitions were wrong since EU's definition of a small company is between 10 and 49 employees and a large company have at least 250 employees. According to Lind, Zmud and Fischer (in NUTEK, 1999) larger organisations are more inclined to use information technique than smaller ones since larger organisations have a superior variation grade in information and a larger organizing loose. Further, smaller companies are are less willing to use information technique because they lack financing for that type of investment according to Doudikis, Smithson, Lybereas; Crag & King; Montazemi in NUTEK, 1999. I haven't found anything in my analysis that shows that larger organisations tend to use information technique more than smaller ones. One explanation to that is that every company that I interviewed were already using IT in one way or another. There was a large knowledge spreading since some companies were working professionally with IT everyday while others were only using it for mail or sending document to customers and so on. Further, I haven't found any differences between companies with five or thirty employees, and that's because all four companies I interviewed were small according to EUs definition of small companies.

My second assumption was that employees with a high education should be more willing to use IT compared to employees with less education. I thought of myself and how I reacted when I paid my bills at the Internet bank for the first time. I was avoiding it since I thought it would be complicated, and I was afraid that I would do something wrong and that my money would reach the wrong payment receiver. After I had bought my own computer and became more familiar using it, I tried to paid my bills at the Internet bank, and to my surprise it wasn't complicated at all and my fear disappeared when I saw that great bank security. Further, after three year of education, I am not afraid to use a computer anymore; instead I am more or less dependent on it. On the basis of those experiences I thought that I could put the equal sign between high education and high willingness to use IT. According to Stockman & Dokter (NUTEK, 1999) the grade of using information technique influence swhich sort of education level the company has. The higher the education level is among the management and employees, the higher the willingness is to use technical information applications. Not even here could I see anything that confirmed the statement that the education level of the company will influence the grade of using information technique since every interviewed company already thought that they had good knowledge and because of that they weren't afraid for implement new technique. On the other hand, I could see some truth in the statement that says that the higher the education level is among the management and employee, the higher the willingness is to use information technical applications since

company A and B had good contact with BIFUN's manager, knew about the planned implementation and were positive to it. Meanwhile, the other two companies, C and D, who hadn't had any frequent and good contact with BIFUNs manager and were negative to the implementation, weren't working with IT in the same way. One company used IT as a professional work tool while the other company use IT as a communication and writing means. I can understand that the companies that work professionally with IT every day think that they don't need further education to manage a new IT implementation, but I cant understand how the other company can be so sure that they don't need any further education since they don't work with IT in a professional way. I think this is a result of their lack of contact with the management since it is easy to say that they don't need any further education if they don't know what the implementation demands.

Finally I had, like NUTEK (1999), an assumption that there are differences in using the information technique between big city region and smaller region, and that the using is more highly developed in bigger cities since it is the fact that there is a concentration of companies with a passive approach to information techniques in the smaller regions. First, my opinion about a big city was Luleå, but know I understand that's not correct since NE defines a big city as when the number of inhabitants are *over* 100 000 and that's far away from Luleås 70 000 citizens. Secondly, since Luleå have a Technical University, I thought that companies from this city were highly developed and use IT more then cities that don't have a university. Based on the material I have analyzed I couldn't come to the conclusion that there are differences in using the information technique between big city region and smaller region and that the using is more highly developed in bigger cities and I think that it depends on two things. First, the places, were the companies work, are of similar size and all have less then 100000 inhabitants videlicet all cities are small cities. Because of that I couldn't say that a company's usage or not usage of IT depends on the cities' size. Second, just because one person has studied at the University in Luleå it doesn't mean that the person haven't moved back to the smaller city were he/she comes from with all knowledge in the backpack. I have heard about people who have started an IT-company in small village outside Luleå since they have the knowledge to communicate and work by and via IT. I can se a danger if people think that just because a company is situated in a small village they have automatic a passive approach to IT. I think that a highly educated person who work in a less stress environment and enjoy the nearness of home and nature, produce much more then a person who work in a stressful work environment.

5.2 Why BIFUN chooses to implement ICT

There are many reasons of why BIFUN's manager chose to implement ICT and several are the same as I have found in the theories and they are:

Competition advantages and as a communication means: The intent of the ICT implementation for BIFUN is above all that the companies will be able to effect their own process and easier communicate within the network and by customers. The manager's wish is also that the company would raise competition advantages. Today he considers that the internal communication process is not working in a smooth and easy way since they haven't got a common communication means. To make a better way of communication and to strengthen and render more effective the companies within the network, he thinks a common ICT platform will help them. Preston (1991) says that since information processing and telecommunications networks are continuing to expand, corporations that use these technologies to their full potential will succeed and in the process raise the standard for competition higher than traditional forms of organization can achieve.

To became global: In BIFUN's case are the companies "global" spread all over Norrbotten. The internet became a global basis for access to world-wide information. In BIFUN, some companies want to be visualised and reached by customers and by ICT they have the ability. According to Vartainen (1991) a virtual organisation aims to provide an organisational solution to problems posed by the uncertainties arising from increasingly intense global competition. In virtual organisations, employees work geographically dispersed, often asynchronously and are linked with each other by using various communication technologies.

Beside the reasons above, BIFUN's manager also hopes that ICT will help them to raise economical profits, give the companies a faster development in new markets and also result in better co-operation between BIFUN's members, and finally that it will increase the company's capacity and use ICT as a daily aid.

5.3 Communication and information in an early stage

Good communication is the be-all and end-all like "communication is a condition for the creative of the information that we call knowledge" Hård af Segerstad (2002). When I examined why the four companies joined BIFUN, and if they were pleased what it have resulted in, I received two answers that differed sharply. Following analysis shows a difference in communication and information within BIFUN that explains the differences in the answer between the companies and the manager. The analysis also elucidates why communication and information are important in an early stage.

According to the chief of BIFUN the objectives of BIFUN are to keep a solid contact and to open the contact way between companies in the network. The contact way creates unity among the members of the organization. The four companies are pleased with BIFUN since they concordantly answered that their contacts and network have increased since they started corporation with BIFUN and that were their reasons for joining BIFUN. Company A and B have positive views about BIFUN's objective and they further stressed that they have good contact with the manager and other BIFUN companies through telephone communication, by taking part in conferences and by exchanging ideas at seminaries. In that way, company A and B are well informed about how BIFUN is working today and what future plans they have for the organisation. Besides that, Company B believes that BIFUN is a good constellation since they have created new markets for their company and they get valuable help in trying to help different contribution. On the other hand, Company C and D are less pleased with what they have acquired from BIFUN although they as well have gained. They haven't had the same frequent contact with BIFUN's management as company A and B. They further state that contacts and co-operation within BIFUN need to be improved, and company D express that he misses the activities and the information meetings they had before. Daniels (1995) states that once people understand that they are determining the company's future business practices and that the process requires their expertise, commitment will be high; participants like to be actively involved in new project.

I found that the theory correspond with all the interviewee's answers since company A and B have positive attitudes and they also have good contact with BIFUN. Both companies are well-informed about BIFUN's current activities and their plans for the future since their commitment are high and they feel that they are actively involved in the organization's new project. However, company C and D are not completely satisfied and do not have good contact with BIFUN, and as a result of that, they are less active in the organisational activities and planning. I think that one way to became positive toward the organization and get better commitment is to have great contact with the organization's management from the beginning. Good contact will help the information get through to all companies within the organization so they know about how the

company's future business practices. In this way they can feel actively involved in the organization's new project and that the process requires their expertise.

I find it strange that company D misses "the activities and information meetings they had before" because it seems that those still exist since company A and B take part of them. All the companies have obtained more contact ways that have lead, for almost all of them, to more customer orders since they became involved in this new project.

5.4 Same information to all members at the same time and continuous information

To give the same information to all members at the same time and continuous information are very important since it is an easy way to avoid a different approach to the proposed implementation that could result in a resistance to the innovation. The questions about how BIFUN have planned to implement ICT in the organisation show that the manager had a well thought-out plan but unfortunately didn't have the information passed along to all companies which resulted in different approach to the implementation.

When BIFUN was going to implement ICT in their organisation, the management said that they have a parallel ICT-project in a "tree company" that they could use as a model. Before the implementation of ICT they began to have idée seminaries to wake an inquiry by the companies videlicet BIFUNs members. The project consists of a "smorgasbord", and it contains all necessary education from the basic level to advance level. In short, that gives the individual the opportunity to choose any courses that correspond to their capacity. After the education BIFUN will offer the companies a mentor that will help them to make an ICT plan for their company and go through how the information's structure looks like and what kind of equipment they need to have. The final step is to create a personal web site, and if the companies have common cluster they will receive help to develop a common web site. He further stressed that before one can start implementation of an ICT project, it is essential to generate ideas by organizing seminaries. This gives the members of the organization the opportunity to be active in and conscious of the implementation. According to Daniels (1995), it is essential to keep people fully informed about the timing of different stages of implementation. There is a danger if people are not kept informed about the timing of different stages of implementation that they may begin to think that full implementation will take place sooner than it actually will. During my interviews with the interviewees a question about the implementation of the proposed ICT project that might lead to a common ICT platform for BIFUN's organization was posed and I received different answers from the interviewees. According to company A and B, they were aware of the proposed ICT project and company B also contributed ideas. Company A and B were very positive towards an implementation. On the contrary, company C and D hadn't heard about the project at all and they asked me questions about it and would like to know what an ICT-implementation really means for their company and why it would be better. I told them that I just know that there was a proposal of an implementation of ICT that might lead to a common ICT-platform for BIFUN's companies, but that they have to ask their manager for further information. Since I had so little information about the proposed implementation, I felt that I shouldn't say too much about it since I was afraid it would cause distortion and cause resistance to the purpose. Angelöw (1991) says that individuals often would like to have direct information about coming changes. To hear about changes through second-hand information and rumours will lead to distortion and cause resistance which is an obstacle for the good changing work. Angelöw (1991) further says that changing measure that builds on participation, security, abundant and direct information and mutual confidence are often usually welcome and seen as positive. Moreover, company C and D were very irritated and would hardly answer my questions about an implementation and the advantages

and disadvantages. One of the companies had an almost aggressive attitude towards me though I had contacted them beforehand so they would know what the interview would deal with. According to Angelöw (1991) a person's energy will be used to defend oneself if he/she perceives a waiting change as threatening. Aggressiveness can be such a defence and it isn't an ordinary and natural anger; it's an exaggerated and sometimes an unexplainable aggressiveness.

To me, it seems that the director of BIFUN had well thought-out reasons regarding the implementation of ICT and how the implementation processes would be carried out gradually or step by step. I think it's positive that he will give the members an opportunity to be active in and conscious of the implementation at an idea-seminary before the implementation, but unfortunately didn't have the information passed further down in the organization and that implies that some companies know about it and some don't. The companies who know something about it haven't received the same information since the information they have, depend on their own investigation. As a result of different information between companies, there could appear rumours which could lead to distortion and cause resistance and that are an obstacle for the good changing work. Angelöws theories about that an individual often would like to have direct information about coming changes, changing measure that builds on participation, security, abundant and direct information and mutual confidence are usually welcome and seen as positive, and a person's energy will be used to defend one self if he/she perceives a waiting change as threatening agrees by the refutation I got from the companies. The companies that knew about the implementation and also had been involved with contributing ideas to the proposed ICT implementation were positive and answered my questions gaily while the companies that didn't know anything about the proposed ICT implementation were more thoughtful and reserved and answered irritated, one person almost aggressive. I have full understanding for this since I found that the companies were unaware and didn't really know what they should think and answer. Regarding the questions the companies asked me, they seem to wonder why they are doing the implementation, if they already have started the work and in that case how far have they come. It seems that company C and D were afraid that the full implementation would take place earlier, instead of later as Daniels says, than it actually will. I found that one way to avoid different approach about the proposed implementation between the companies and to make them secure about what the manager is doing, is to deliver the same and direct information about the coming changes at the same time and then get continuous follow-up information. This will result in all companies feeling that the manager is interested in their opinion, that they have a mutual confidence which is positive. Because of this misinformation, at least two companies are irritated and that could lead to distortion and cause resistance towards the implementation, which is bad for the changing work since they tend to become negative.

Besides the defective information of the proposed implementation, any of the interviewed companies within BIFUN had not received any detailed information at all about *how* BIFUN plan to do the implementation and some companies were really irritated about that. In short, the director's statement corresponded with the theories but it is opposite in reality because company C and D weren't aware of the intended or proposed ICT project, while company A and B were a bit aware of the proposed ICT project. It is strange that it could be like that since I found that the manager had a well prepared model that they have planned to follow. I believe, just like Daniels (1995) that the major task in the first phase of implementation is to spell out how the business operates today, how they will operate tomorrow and the factors that can eliminate the distance between them. I can see a result of that since company A and B are more positive toward an implementation and they also knew about it before company C and D. Company A and B have had the possibility to consider how they are working today, how they can use an implementation of ICT and what it can generate for them. Company C and D did not receive the same opportunity to think of the possibilities which may be an explanation to their negative point of view.

Further I think that if the user is not informed in an early stage about a change or an innovation, the user becomes irritated and more negative against the innovation or change, instead of testing and using it with a great curiosity.

5.5 Analyse the role of ICT

I think an essential factor is to analyze the organization since it is important to alert the organization's members of the advantages and disadvantages of the new technique (ICT) because implementation of new technique is a sensitive phase that involves time and money. I think that the more companies are aware of the benefits of ICT, the more companies will start using it in their organisations and the result of analyzing the role of ICT will be positive, understanding and committed companies and employees who will create ideas and solutions to make the implementation of ICT as good as possible. It seems like BIFUN´s manager have analysed both advantages and disadvantages by using ICT since he have many good reasons to start the ICT project but unfortunately all companies haven't had the same chance because of difference circumstances which will be shown in this analyse section.

The chief of BIFUN states that if one continuously modifies the ICT project, to implement ICT to get a common platform in the organisation, it will speed up the development of the companies, give them an upper hand during competitive situation and in that way increase the earnings. He sees IT as a remedy for daily work. However, he doesn't believe that ICT will create a new organisation; instead ICT is a communication mean. The major objective with this kind of project is that the companies will be more effective in their own processes for example by co-operating their productions by help of ICT. He further emphasizes that if a side effect, such as them starting to communicate within the network, arises beside the aim (to effectiveness their own process) it will be positive for the network. Dabinett & Graham (in NUTEK, 1994) points out that Information technology is used internally to support communication channels and processes and Kreps (in NUTEK, 1994) further suggests that internal communication channels are usually used to spread and support goals, rules and formal procedure within organizations. Finally, the manager can't really say if there is any risk with implementation of ICT in organization but new technology in organization require new knowledge in the organization. That means the personnel need to have a basic knowledge of the new technology.

Regarding the advantages and disadvantages with ICT in organisation, the interviewees' answers are slightly different. In short, company A and B pointed out that they could see advantages with ICT since they believe that with the help of ICT, it will be easier to make contact and work effectively with customers. In addition, company B believes that ICT would be helpful in term of marketing. According to Grabowski & Roberts (1998) and Jarvenpaa & Leidner (1998), ICT enables virtual organizations to be adaptable, flexible, and have the ability to respond quickly to market changes and Porter & Millar (in Daniels, 1995) states that the information revolution is affecting the nature of competition by changing the industry structure and alters the rules of competition and creates the competitive advantage by giving companies new ways to compete. Accordingly, company A and B see that they will adapt oneself faster and better to the market and its customers and in that way win more competitive advantages when their work became more visual. Company A and B further stressed that they could also see some disadvantages with the implementation of ICT in organization. They believe that implementation of ICT in organization might affect the personal contact within the organization. This means the personal contact might be reduced. Nevertheless, company B believes that it might be dangerous if the needs for ICT are not expressed before carrying out the implementation. Company C and D believe that there are no advantages or disadvantages with ICT in organization, their main interest is to increase contact within BIFUN, with both companies and the manager, and not to start such a project like ICT.

Since it is complex to understand the quality of experience of information technique the companies must give a composed picture of the conception that rule and influence the motive for using the technique and according to Roger (in NUTEK, 1994) the dimensions, Relative advantage and Compatibility of the experience quality by an innovation, are important. Relative advantage is the experienced advantage of information techniques towards other solutions of the companies' communication problems and compatibility means the experienced agreement between the new techniques and by existing work routines, norms and values by the user.

The director of BIFUN and company A and B opinions and thoughts about the advantages and disadvantages with ICT correspond well with the theories. Company A and B are conscious of the advantages with ICT, they said that with ICT it will be easier to make contact and work effectively with customers and it could be helpful in term of marketing. In addition, the director of BIFUN also has a positive attitude towards ICT, he stressed that ICT will increase the communication channels and process within networking and this statement fully agreed with Dabinett & Graham´s (in NUTEK, 1999) theory. I found that because company A and B have a better and more frequent contact with the director of BIFUN and as we know they also had the opportunity to discuss the implementation with him, which company C and D did not have, giving them time to think about and realize the advantages with ICT. Since company C and D weren't aware about the proposed ICT project, it is difficult for them to see or imagine the advantages and disadvantages with ICT. Since company A and B can see both advantages and disadvantages with an implementation and company C and D can't, I consider that it is very important to analyze the role of ICT and discuss why it is implementing. By analyzing the role of ICT, the employee can easier see the reasons for using ICT to help restructure the business processes and clarify which advantages and disadvantages it has for their company. After analyzing the ICT's role in the organisation, the companies and their employees have the possibility to see the relative advantage, the compatibility, and the complexity of the experience quality by the innovation/implementation. This is important since the more familiar you are with something, the more positive you are about it, and the fear of a new technology will disappear when the user understand the complexity of the system and how it will be solved.

One thing that doesn't correspond with the assertion of BIFUN's manager is the theory where Daniels asserts that internal communication channels are usually used to spread and support goals, rules and formal procedure within organizations. The manager of BIFUN hasn't mentioned that since his main reason for the implementation is that the companies will be more effective in their own processes. I construe that BIFUN doesn't want to give the companies goals, rules and formal procedure to follow. Instead, BIFUN wishes the companies made those for themselves.

5.6 Get employees involved

From the answer, that deal with how the personnel and the companies will be influenced, I now understand that it is important to get the employees involved in the implementation process because there will be a larger engagement since the employees knows best what needs the company have and the implementation can be suit to them. The organizational change doesn't seem so complex if they feel that the changing measure built on participation and mutual confidence between them and the manager and that their competence is important.

BIFUN hasn't particularly thought about how the implementation of ICT will influence the companies personnel but the director think that if the implementation is carried out in appropriate ways it could increase some kind of involvement and more people will take part in the companies' business.

Kreps (in Nutek, 1994) suggests that internal communication channels are used to socialize the organization's members in the organization's culture, and Daniels (1995) says that involving key decision-makers in the design of ICT systems is necessary to ensure that all shareholders understand the advantages to be gained with the ICT. Angelöw (1991) says that changing measure that builds on participation, security, abundant and direct information, and mutual confidence are often usually welcome and are seen as positive.

In this context, company A and B have a positive view that communication and coordination will definitely increase, it would be faster and better. Company B believes that a common ICT-platform will tighten the co-operation and the dialogue. On the other hand, Company C and D believe that the communication and coordination will not change at all. Furthermore while three interviewees weren't sure that their companies will develop by becoming a virtual organization, company B think that working together will increases competitive power that can lead to an organization development. To add more it will enable them to participate in enormous projects that could not be possible when standing alone with limited resources.

I found that the companies' answers agreed mostly with the theory in two ways. Both company A and B see how ICT can help or support the communication and coordination, which means how ICT will increase the development of the companies. At the same time, they also see risks that one should be aware of. Company C and D have difficulty to believe that the companies' communication and coordination will change at all. There is a large different between the answers of company A and B with company C and D and since I known before, company A and B have a good and frequent contact with BIFUN's management and company B have come with implementation ideas. According to my opinion, company A and B know the organisation's culture and company B is involved as key decision-makers in the design of the ICT systems for the network BIFUN. Unfortunately, all shareholders, in this study company C and D, don't understand the advantages of implementing ICT since there has been a lack in the communication and further information. Further I think that this is a result of that company A and B knew about the implementation before the other two companies and because of that they've got the opportunity to think of the consequences. Besides that, company B is the one who is mostly positive to an implementation and he is also the one who have give ideas about the implementation. I think that the more you are familiar with something, the more you become positive about it and that will result in committed companies and employees who create ideas to make the implementation of ICT as good as possible. Another explanation to why company B are mostly positive to an ICT implementation is that they are a small company and more dependent on a co-operation between companies since they don't have the ability to manage large orders by themselves.

5.7 Education and training

A natural way to reduce the complexity of using ICT is to raise the level of knowledge by education and counselling. When companies agrees with the ICT implementation, they have the opportunity to see what kind of education they need to manage it and they feel that they can influence the education and that's important since knowledge about ICT in an important motive behind the introduction of it. I believe that this conclusion can be seen in the text below.

Regarding knowledge of technology in the organization today, the director of BIFUN believes that the members of BIFUN require basic fundamental knowledge to manage the proposed ICT project since they have different backgrounds of computer science. Some of the companies don't have e-mail while other companies are working with advanced drawing system. The manager of BIFUN sees this as a problem for the personnel education but insists that the education must be

customized and starts at a basic level and gradually advance. Thorn & Yap (in NUTEK, 1999) says that knowledge about information technique has shown to be an important motive behind the introduction of information technique in small business. Stockman & Dokter (in NUTEK, 1994) says that which sort of education level the company has will influence the grade of using information technique. The higher an education level is among the management and employee, the higher the willingness is to use technical information applications. Daniels (1995) says that during the implementation the management need to determine what level of technology understanding the company needs to have and what level do they have since it is closely linked to education and training in most companies.

The interviewees are united in the belief that none of the personnel in their companies will be affected, nor think that an ICT implementation will be difficult to understand since they all have computer skills and work more or less regularly with computers. With this perception, all interviewees think that they don't see any need of further understanding and knowledge of the technology. Despite the fact that it can be complex, it is necessary to understand the quality of experience of information technique to give a composed picture of the conception that rule and influence the motive for using the technique. (NUTEK, 1994) Rogers (in NUTEK, 1994) three dimensions: Relative advantage, Compatibility and Complexity of the experience quality by an innovation, are important. Relative advantage is the experienced advantage of information techniques towards other solutions of the companies' communication problems. Compatibility means the experienced agreement between the new techniques and by existing work routines, norms and values by the user. Complexity is the experienced difficulties to understand and use the information technique in the company.

It is interesting that BIFUN's director consider that the companies need a basic education to be able to use ICT when the companies believe that they already have basic computer knowledge since they work with IT daily. The director's opinions agreed relatively well with Stockman & Dokter´s (in NUTEK, 1999) discussions, where they point out that the higher the education level in the company, the easier the employees accept and use ICT. I understand that the companies think that they don't need any further education for an ICT implementation since they really don't know what to expect.

5.8 Use the same way of communication

Using different communications means and channels within the organization may involve a large risk that information passes by someone. Within BIFUN they use different way to communicate with each other and as I can see it have resulted in some misunderstandings and irritations.

Concerning the organization's internal communication, the director of BIFUN believes that one of the major problem is that not every company uses mail in their daily work. However, he tries to pass information to the customers via e-mail but to be sure that the information is received, he use post as well and because of that he thinks that the internal communication is not working as it should since many employees are still unfamiliar with using a computer and they prefer to communicate by telephone or face-to-face. Further, he hopes that the planned implementation of the common ICT-platform will help the organization to communicate via the web and that the companies will be more effective in their own processes. Since it takes a lot of time and is expensive to send information via letters, all information aren't reaching the members and in order to immediately improve the situation, they are now planning to inform the members of the organization by a newsletter. Daniels (1995) states that to identify competitive information system needs accurately, executives and managers need to look at the key events that occur in the

business process. Finally, he thinks the only information barrier in the organization today is the secrecy policy the general operation has with every company members.

I find it positive that the manager tries to improve the networks communication channel. Today he knows that there is too little information that reaches the members and to correct that he is planning for a newsletter, and with a common IT-platform he believes will help them to communicate in an easier way with each other and by customers.

The answers I received from the companies regarding information flow and communication were not the same. To start with, the major information flows of company A are offers, orders, handling of drawing and economy. Company D says that they have no special information flow. Furthermore, company B and C were sure that the most important information flow is to make the company visible to the customer and communicate with them. Daniels (1995) says that information that may be of competitive value is associated with these key events of the business. By tracking this information, management can more precisely decide on the actions to take.

From company C and D point of view, there are no barriers in the general operation while company A and B believe that there is. However company A think that the internal work between companies could be more effective if everyone in the organisation have and use a computer. Nonetheless, company B believes the traditional way of information, such as a brochure, expensive but if one can computerize it then it would be good since cost reduction is important. During external communication, all the interviewees often send documents through post and then use face-to-face during internal communication. Finally they use telephone mostly for communication in this organisation. Daniels (1995) points out that it is important to know the current state of the communication infrastructure in the company and if there are information barriers among the key cycles business. My respondents in BIFUN use different communication channels, the order of frequency as follows: Firstly, face-to-face is the most frequent communication means when they contact other or when they are been contacted. Secondly they use the telephone to reach first contact with customers. Thirdly, they use E-mail for distribution of documents and confirmation of information. Fourthly, they use and receive post to send formal order to customers and they receive a lot of commercials. Fifthly, the fax is use both to send and receive short message, forms and signature on documents. Sixthly, they use telephone conference and finally they use video conference to be able to reach customers in other cities. None the interviewees have ever used conference system such as First class, Web CT and none of the interviewees have use SMS in business but they have tried it in their personal life.

Company B's and C's attitudes against their information's flow agreed really well with Daniels theory that says "Information that may be of competitive value is associated with the key event of the business" since my opinion is that company B and C consider that their key event of the business is to make the company visible for the customers and to communicate with them. Through communication with the customers they can decide on which actions to take.

In regards to the communications in the organisation, company A and B consider there to be barriers that could be eliminated with help of ICT, while company C and D aren't conscious about any. Moreover, the director of BIFUN is conscious that there are different communication barriers in the organisation. How this corresponds with the theory is hard to say since two of the companies don't believe there are barriers but I think it is positive that the director consciously tries to measure the communication barriers that he experiences within the organisation. However, it is strange that the respondent from the companies doesn't experience the same barriers as the director except for company A. What this depends on it is hard to say since there can be many explanations. Perhaps, they don't experience them since they don't know them but I think it

depends on two things. First, the director is aware that the information he has will not reach all the members because of communication barriers and he also sees the possibilities of development that could be realized by a better internal communication. Secondly, company A have the same experience as the manager and that can depend on, as we know before, that they have a good and frequent contact with the manager.

With the help of Daniels (1995) statement that "it is important to know the current state of the communication infrastructure in the company" and the evaluation table, I am now conscious that BIFUN organisation communicates mainly through face-to-face, telephone and e-mail but BIFUN's director would like to use mail by internal communication as a first choice. The companies mostly like face-to-face communication since they think it is easier to talk with someone they could see but they realize that it isn't always possible and in these situations they prefer to use the telephone. E-mail came in at third place because it was unpopular as a communication means since they thought there to be lots of misunderstandings, but someone think that email could make a telephone call more concise if you beforehand have mailed a document. I think that it is important to use the same communication channels within the organization since there is a large risk that information passes by someone. It is also hard to have a good and frequent communication with each other if the persons use different communications means, for example one person use letters and the other use e-mail. In that way the communication will not success since the "the letter man" will not reach the information since he doesn't read mail and the chance for misunderstandings is large.

I find company C and D's answer concerning barriers within the organization a little bit strange. They answered that there are no barriers in the general operation but earlier in the research questions it was clear that they think the contacts and the cooperation with both the companies and the manager within BIFUN need to be improved and that they miss the activities and the information meetings they had before. Furthermore, they haven't heard about the ICT project at all and they asked me questions about it and would like to know what an ICT-implementation really means for their company and what would be better for them. According to my opinion, it seems that there is a large information barrier between this two companies and the manager of BIFUN. Therefore, discuss within the network what kind of communication channel will be used, and what kind is most effective, easy to manage and suited for their business.

6 Conclusions

In this ending chapter I conclude with my own reflections of what I have learned from this research and what I have found the most important factors are to an implementation of ICT. These factors are my contribution to the research and they will answer the purpose that I have in this study.

When I started this research I was interested about why network organizations would like to transform themselves to become a virtual organization and how they were doing it. Since a new ICT system cost plenty of money for an organization and its companies, they can't afford to fail with the implementation. The implementation must be a success for both the organization/companies business and for its employees. Since I was curious about the human aspects I have studied which factors should an organization consider before implementing ICT in a network organization.

I have found in my research that if an organization management will succeed in transforming a network organization into a virtual organization by implementing ICT, they have to be conscious about the factors which are the difference between success and total failure. By observing these factors the changing work will run smoother, the result became better and the companies will be positive both to the manager and the change. The factors are; to communicate and inform the companies and its employees in an early stage, to give the same information to all members at the same time and continuous information, to analyze the role of ICT, to get the employee involved, to have education and training about the ICT and finally, to use the same way of communication within the organization. I believe these six factors very important to all kinds of organizations or companies by a changing work and not only by network organizations. I think that communication is the most important means in all forms of change, when people who will be influenced are involved, and there are only advantages by using it. One avoids misunderstandings, the employees feel safe and make a larger engagement in their work which leads to new creative ideas and the companies and its organization can develop. But the largest asset, by using a well-developed communication, is that every individual person will develop themselves since the human can never be skilled enough.

The six important factors I have found are: Communication and information in an early stage, same information to all members at the same time and continuous information, analyze the role of ICTs, get employee involved, education and training and finally use the same way of communication.

- Communication and information in an early stage: The information will reach the members in an early stage if the organization establishes a good and frequent contact from the beginning. By informing at an early stage the interest and engagement will be larger since eventual fear, that can be shown if ones don't understand, will disappear. If the companies are allowed to express their opinions and ideas about what their company needs to be more effective, it will result in a lager engagement of the user and the system becomes more suitable and better when there is ability in an early stage to reduce hardly successfully functions.

- Same information to all members at the same time and continuous information: No matter what is being communicated, it's important that every company get the same information at the same time. Lack of communication will lead to ambiguousness and dissatisfaction when the companies employees begin to talk with each others and misconceptions are

created when everyone haven't got the same information. Wonderings like "Why have they information about this and not me?" will easily come up and result in irritation. Besides that, companies can experience a frustration when they must have a constant frequent contact with the management to not miss some important information. I establish the fact that it is hard to keep up to date on what's going on if ones doesn't know what kind of information one should ask for. If one informs the companies continuously about news and change, the companies knows what's happening and they became safe. This will result in that the companies don't have to call to the management or the director continually to know what's going on. Instead they make a call when there is something they want to discuss or when they need a deeper understanding or an explanation to something.

- Analyze the role of ICT: It is important to analyze the role of ICT to be able to see the relative advantage, the compatibility and the complexity of the experience quality by an innovation. The more you are familiar with something, the more you become positive towards it and you can se both relative advantages and compatibility. The fear of a new technology will disappear when the user understands what part of the system is complex and how they are going to solve it. That will result in positive, committed companies and employees who create ideas and solutions to make the implementation of ICT as good as possible.

- Get employees involved: If the employees are involved in the implementation process there will be larger engagement, ideas will be created about the company needs, and the organizational change will be welcomed and seen as positive since changing measure built on participation and mutual confidence, and the employees' experience and competence are the most important means for a good result in a organizational change.

- Education and training: If the companies and their employees are agreeing with what's demanded of them by an implementation of ICT, they have the ability to decide which kind of education and training they need.

- Use the same way of communication: There is no point in using different ways of communicating with each other in a network since there is a large risk that information passes by someone and there will be misunderstandings. Therefore, discuss within the network which kind of communication channel will be used and which is most effective and easy to manage. A common ICT-platform can be one way for the companies and the management to reach each other in an easy way. Everyone gets the same information at the same time and it's up to every company and its employees to engage themselves and use the information in a way they want.

6.1 Suggestions to further research

After several months of work with this study, different thoughts have been prevalent. I will present these thoughts as my suggestions to further research where ones can see if there are some distinguish between how different companies use the seven factors by an implementation of new technique.

The first research could be if the personnel was allowed to have a different influence on an organizational change and implementation of ICT, within larger or smaller companies. The second research could be a comparison of the personnel influence within a government or

private owned company. The last further research would be to see if personnel participation differs between different cultures and between geographical cultures.
By examining how the employees influence and contribute to an organizational change if an implementation of new technology takes place, how it differs between various kinds of companies (government, private, national, international) and comparing this to the result of how the employees experience the change, one can get a further explanation of how important the seven factors are to an organizational change that implies an implementation of new technique.

References

Ahuja, M.K. and Carley, K.M. (1998). *Network structure in virtual organizations*. Journal of Computer-Mediated Communication, 3(4): 1-31.

BIFUN web site (2003-04-24). www.bifun.nu

Bleicher, J. (1980). *Contemporary Hermeneutics: Hermeneutics as Method, Philosophy and Critique.* Routledge & Kegan Paul, London and Boston.

Bendix, J & Dalsgaard, L (1998) *Nätverksorganisering: etablering och ledning av nätverk som ny organisationsform.* Konsultförlaget, Uppsala.

Davidow, W. & Malone, T. (1992). *The virtual corporation.* HarperBusiness, New York.

Daniels, N.C (1998). *Information Technology - The management challenge*

Dobson, P. J. *Approaches to Theory Use In Interpretive Case Studies – a Critical Realist Perspecitve*, Lecturer – School of Management Information Systems, Edith Cowan University Churchlands, Western Australia.

Ekholm, M. & Fransson, A. (1976). *Praktisk intervjuteknik.* Beyronds AB, Malmö.

Eriksson, L, T. & Wiedersheim-Paul, F. (1999). *Att utreda, forska & rapportera.* Liber Ekonomi, Stockholm.

Gadamer, H-G. (1976). The Historicity of Understanding, in *Critical Sociology, Selected Readings*, p. 117-133. Penguin Books Ltd, Harmondsworth.

Goldman, S.L., Nagel, R.N., & Preiss, K. (1995), *Agile Competitors and Virtual Organizations: Strategies for enriching the customer*. Van Nostrand Publishing, New York.

Hastings, C. (1993) *The New Organization: Growing the Culture of Organizational Networking*. IBM McGraw-Hill

Holme, I. M. & Solvang (1997). *Forskningsmetodik – Om kvalitativa och kvantitativa metoder.* Studentlitteratur, Lund.

Hård af Segerstad, P (2002). *Kommunikation och Information – en bok om människans förmåga att tänka, tala och förstå.* Uppsala Publishing House AB, Uppsala.

Jackson, P. (Ed.) (1999). *Virtual working, social and organisational dynamics.* : Rutledge, London and New York.

Jacobsen, D. I & Thorsvik J. (1998) *Hur moderna organisationer fungerar: introduktion i organisation och ledarskap.* Studentlitteratur, Lund

Jacobsen, Krag, J. (1993). *Intervju: Konsten att lyssna och fråga.* Studentlitteratur, Lund.

Jarvenpaa, S.L. and Leidner, D.E. (1998). *Communication and trust in global virtual teams.* Journal of Computer-Mediated Communication, 3(4):1-38.

Johansson, B., Svedner, P-O. (1998). *Examensarbetet i lärarutbildningen – undersökningsmetoder och språklig utformning.* Kunskapsföretaget i Uppsala AB, Uppsala.

Johansson-Lindfors, M-B. (1993) *Att utveckla kunskap: om metodologiska och andra vägval vid samhällsvetenskaplig kunskapsutbildning.* Studentlitteratur, Lund.

Norén, L (1987). *Ny teknik i små företag.* BAS, [8], p.213, Göteborg.

NUTEK (1999). *Nyttan av IT – i småföretagarens ögon.* Elanders Gotab, Stockholm.

Preston, S.M (1991). Virtual Organization as Process: Integrating Cognitive and Social Structure Across Time and Space. Journal of Computer-Mediated Communication and Organization Science on Virtual Organization.

Radnitzky, G. (1970). *Contemporary Schools of Metascience*. Scandinavian University Books, Goteborg.

Robbins, S. P. (2001). *Organizational Behavior. Prentice-Hall, Inc., Upper Saddle River, New Jersey.*

W. Saabeel, T.M. Verduijn, L. Hagdorn, K. Kumar. A model of virtual organisation: A structure and process perspective. Rotterdam School of Management Department of Information & Decision Sciences, Rotterdam, Netherlands.

Trochim, W. (1999). The research methods knowledge base. 2nd ed. Cornell Custom Publishing, Cornell University, Ithaca, New York.

Taylor, C. (1976). "Hermeneutics and Politics" in *Critical Sociology, Selected Readings* pp. 153-193. Penguin Books Ltd, Harmondsworth,.

Trost, J. (1997) Kvalitativa Intervjuer, Studentlitteratur, Lund.

Vartiainen, M. *The Functionality of Virtual Organizations.* Helsinki University of Technology, Finland.

Wiesenfeld, B.M., Raghurum, S. & Garud, R. (1998) Communication patterns as determinants of organizational identification in a virtual organization. Journal of Computer-Mediated Communication, 3(4).

Winter, J. (1992) *Problemformulering, undersökning och rapport.* Almqvist & Wiksell, Stockholm.

Yin, R., K. (1994). Case Study Research – Design and Methods. Sage Publications, USA.

Appendix 1 Intervju med BIFUNs VD

1. Vad anser du att skillnaderna är mellan en nätverks organisation utan IT-krav och en virtuell organisation. Vad anser du att BIFUN är idag?

2. Vad anser du att syftet med BIFUN är?

3. Vilka kommunikationsproblem anser du att det finns idag inom organisationen BIFUN? (Enligt dig ”som alla nätverks och virtuella organisationer har”.)

4. Vilka är fördelarna för BIFUN att implementera IT i organisationen? Ex. Ökade vinster, snabbare utveckling av företagen, konkurrensfördelar m.m.

5. Vilken risk finns det att organisationen påverkas negativt av en teknisk implementation? Ex. Organisationsstrukturen förändras, kommunikationen försämras m.m.

6. Hur kommer organisationen med dess företag att utvecklas av en teknisk implementering?

7. Hur tror du och vad hoppas du på att personerna i företagen kommer att utvecklas av en IT-implementering? Ex. Genom Knowledge Management, ökat samarbete, vidareutbildningar, stress, ökad/minskad motivation m.m.

8. Vilken grad av förståelse och kunskap om teknologin behöver företagen i er organisation ha? Vilken kunskap har de idag?

9. Hur kommer implementeringsprocessen att gå till, vilka steg kommer ni att följa?

10. Vilket informationsflöde är det viktigaste i er organisation idag?

11. Finns det informationshinder kring er huvudverksamhet i organisationen?

12. På vilket sätt är er kommunikation uppbyggd och vad använder ni er av mestadels idag inom er organisation?

13. Hur kommer BIFUN att fungera i framtiden? Vad är din förhoppning?

Appendix 1 Interview with BIFUNs VD

1. What do you think are the different between a network organisation without a demand of IT and a virtual organisation? What do you think BIFUN is today?

2. What do you think is the aim of BIFUN?

3. Which communication problems do you think exist today within the organisation BIFUN? (According to you "like every network and virtual organisations have".)

4. Which is the advantage for BIFUN to implement IT in the organisation? Ex. Raised profits, faster development of the companies, competition advantages and so on.

5. Which risk is it that the organisation will be negative influenced by a technical implementation? Ex. Organisation structure will be change, communication deteriorate and so on.

6. How will the organisation and its companies develop by a technical implementation?

7. What do you think and hope for that the personnel in the companies will be developed by an IT- implement? Ex. By Knowledge Management, raised cooperation, further education, stress, raised/less motivation and so on.

8. Which grade of understanding and knowledge about the technology does the companies in your organisation need? Which knowledge do they have today?

9. How will the implementation process perform, which steps will you follow?

10. Which information flow is the most important in your organisation today?

11. Is there any information's barrier round your main activity in the organisation?

12. In which way is your communication based and what do you mostly use today?

13. How will BIFUN work in the future? What is your expectation?

Appendix 2 Företags intervju

1. Varför gick ert företag med i BIFUN? Vad trodde ni att ni skulle få ut av att vara med i organisationen?

2. Vad får ert företag ut av att vara med i BIFUN?

3. Vad anser ni att BIFUN är idag? Ex. Traditionell organisation, nätverksorganisation, virtuell organisation.

4. Vet ert företag om att BIFUN kommer att genomföra en förändring och utveckling av informations teknologin?

5. Vad vet ni om den förändrings process som kommer att innebära en implementering av informations teknologi i BIFUN?

6. Vilka är fördelarna för BIFUN att implementera IT i organisationen? Ex. Ökade vinster, snabbare utveckling av företagen, konkurrensfördelar m.m.

7. Finns det några nackdelar med att implementera tekniken i BIFUN? Ex. Organisationsstrukturen förändras, kommunikationen försämras m.m.

8. Hur tror ni att kommunikationer och koordinationen, företag emellan i er organisation, kommer att förändras om tekniken införs? Positivt och negativt.

9. Hur tror ni att ert företag kommer att utvecklas av att ingå i en virtuell organisation med IT-stöd?

10. Hur kommer personalen att påverkas av en IT implementation?

11. Vilken grad av förståelse och kunskap om teknologin behöver ert företag ha? Vilken kunskap har ni idag?

12. Vilket informationsflöde är det viktigaste i er organisation idag?

13. Finns det informationshinder kring er huvudverksamhet i organisationen?

14. På vilket sätt är er kommunikation uppbyggd och vad använder ni er av mestadels idag inom er organisation?

Appendix 2 Companies interview

1. Why joined your company BIFUN? What do you thought you would get from it by joining the organisation?

2. What does your company actually get from BIFUN?

3. What do you concern BIFUN is today? Ex. A traditional organisation, network organisation, virtual organisation.

4. Does your company know that BIFUN will accomplish a change and development of the information technology?

5. What do you know about the changing process which will contain an implement of information technology in BIFUN?

6. What are the advantages for BIFUN to implement IT within the organisation? Ex. Raised profits, faster development of the companies, competition advantages and so on.

7. Are there any disadvantages by implement the technique in BIFUN. Ex. The organisation structure will change, the communication get worse and so on.

8. How do you think the communication and the coordination between companies within your organisation will change if the technique introduce? Positive or negative.

9. How do you think your company will develop by being a part of a virtuel organisation with IT-support?

10. How will the personnel be influenced by an IT implementation?

11. Which grade of understanding and knowledge about the technology does your company need? Which knowledge do you have today?

12. Which information flow is the most important in your organisation today?

13. Is there any information obstacle around your head activity within the organisation?

14. In which way are your communication edified and what do you mostly use within your organisation today?

Appendix 3 Utvärdering av kommunikationsvägarna inom BIFUN

Kommunikations kanaler	**När/vid vilket tillfälle *föredrar du* att kommuncera via:**	**När/vid vilket tillfälle kommunicerar *andra* med dig via:**	***Generellt* sett hur kommunicerar du *med andra inom BIFUN*?(Gradering 1-7 där 1 är det mest frekventa)**
Face-to-face (direktkontakt)			
Telefon			
E-post			
Fax			
First Class konferenssystem			
Web CT			
SMS			
Videokonferens			
Telekonferens			
Brev			
Annat			

Appendix 3 Evaluation of communication means within BIFUN

Communications means	**By which occasion do you *prefer* to communicate via:**	**By which occasion communicate *others* with you via:**	***In a generally* way, how do you communicate *with others within BIFUN*?(Graduated 1-7 where 1 is the most frequent)**
Face-to-face (direct contact)			
Telephone			
E-mail			
Fax			
First Class conference system			
Web CT			
SMS			
Video conference			
Telephone conference			
Letters			
Others			