# Effects of system integration in an organization

## A case study carried out in the photo and home electronics branch

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## Abstract

Organizations often have information systems belonging to different computer generations. These systems contain much valuable data to the organizations concerned. However, these systems are often unable to communicate with each other, due to incompatibilities. Moreover, replacing these systems with new systems is also very costly. Therefore the latest trend is integrating the existing systems with each other with the help of different system integration technologies. When the systems are integrated with new technology they bring about various effects to the organizations in concern.

The purpose of this thesis is to find out how system integration affects an organization in the photo and home electronics branch, namely Expert. The questions that will be raised in this thesis are how does system integration affect the organization's work processes and how does system integration affect the organisation's employees. I have studied how system integration has affected the work processes and employees of the retail stores. In order to find answers to these questions three qualitative interviews were carried out. One interview took place in the central organization and the rest in retail stores in Linköping.

There are many reasons, which led Expert towards using system integration. Some of the main reasons are increased profitability and decreased costs for maintenance and upgrading of different systems. Further, the retail stores required better information channelling and streamlining of work processes in order to provide salesmen at retail stores possibility to concentrate more on customers by minimising administrative work.

I have found that system integration has affected the organization's work processes and its employees both positively and negatively, in other words system integration has helped Expert to decrease administration work, provided salesmen at retail stores more time to deliver better service to customers, has automated key work processes saving time and reducing redundancy of work. Even if, the organization is quite satisfied with the benefits the existing system integration technologies have rendered to them, there are many more privileges, which can be achieved.

## Acknowledgements

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# 1. Introduction.

*This chapter serves as an introduction to the thesis. At the beginning of the chapter the background to the actual research area is presented under the heading Research issue. It is followed by the objective of the study and problem statements, which lay the basis for the study. Then limitations and the target group for the study are presented. Finally, a brief description of the contents of each chapter is given.*

## 1.1 Research issue

In today's highly competitive and constantly changing world organizations are compelled to find ways of functioning effectively and cost efficiently for their survival and success. Moreover, the competitive arena has also changed dramatically, thus organizations can no longer depend on traditional methods of competing. As a result companies seek out latest technologies.

Many organizations use several generations of systems that rely on a broad range of technologies developed over many years. These technologies both new and old provide enormous support to organizations. Unfortunately, many of these business-critical systems are difficult to adapt to allow them to communicate and share information with each other and more advanced systems. There is always the option of replacing these old systems with new ones but it is very costly and time consuming. In addition they contain lots of data and information, which are of great value to organizations.

System integration is seen as a way of solving most of these problems. In earlier days system integration was confined to technical aspects such as for connecting computer hardware components. As knowledge on information technology evolved integration came into use in software, data and communication as well.

System integration architectures such as EAI and Web services are very popular in the market at present. Leading software companies such as SAP and IBS develop numerous types of software, which support these system integration architectures.

When new technologies are introduced into organizations they affect organizations in many different ways. In the same way due to implementation of different system integration methods organizations get affected in various ways. They obtain benefits, face obstacles, new demands arise, have to make adjustments etcetera.

As I was striving to broaden my knowledge on this subject, I noticed much emphasis being drawn towards the benefits that organizations can obtain. The most frequent arguments placed in favor of this technology are the increase in profitability, efficiency and better quality. However, scarce amount of attention have been given to the diverse effects this new technology can bring about in organizations. These IT solutions can create even unexpected effects and problems too. The reasons behind them can be many and complex as well. Therefore I felt it was interesting and worthwhile carrying out a study on the effects of system integration on the working environment of an organization.

## 1.2 Objective of the study

The use of different system integration technologies in organizations cause changes in the functioning of the organizations. Therefore it is interesting and vital to study these changes. With that idea in mind I have formulated the objective of this thesis as follows:

The purpose of this thesis is to identify the effects on an organization's functioning from their existing system integration solution/solutions.

## 1.3 Problem statements

The following questions, for which I am going to find answers, are formulated in accordance with the purpose of this thesis and with the organization (Expert Invest AB and its retail stores) I chose to carry out my study in. They are as follows:

- How are the organization's work processes affected by the system integration solution/solutions?
- How are the employees (users) affected by the system integration solution/solutions?

## 1.4 Limitations

I have limited this study to only the organizational perspective and only to the effects caused by the existing system integration solution/solutions to the organizations functioning. In addition, the study will be limited to Expert retail stores situated in the city of Linköping.

Another limitation is that extensive technical details of the existing system integration solution/solutions will not be studied. I will only focus on the technical architectures of those solution/solutions. Expert uses Web services (one of the latest system integration technologies) on a minor scale and therefore I will not write about it. Further, I will not do any detail study of the user interface, which is used at the expert retail stores.

## 1.5 Target group

This thesis addresses mainly my fellow students of the Information Systems Analysis program. This will give them an insight in the area of system integration and its relationship to an organization's functioning

This thesis is mainly addressed to those who are interested in system integration technologies and their impacts on organizations for example IT managers as well as consultants of different system integration solutions. They will be able to get a better understanding of how to obtain maximum benefits from system integration technologies to organizations while imposing minimum inconveniences to employees. Furthermore, they will be able to plan strategies for more effective and safer workflows with low redundancies, lower costs and less wastage of resources. This will also be useful to organizations that are planning on investing in system integration solutions so that they can purchase better system integration solutions, which realize their expectations

## 1.6 Thesis structure

This thesis contains seven chapters. The following is a brief description of the contents in each chapter.

In chapter 2 I have explained the methods I have used to carry out this study. Thereafter follows the theoretical framework in chapter 3. There I have presented required theory for the study. Chapter 4 consists of Empirical study where results from the data collection are presented. Then follows an analysis of the study in chapter 5 there I connect empirical base with theoretical framework. Finally the conclusions are presented in chapter 6. The thesis concludes with a short discussion (Chapter 7) on my reflections concerning the study and proposals for future research.
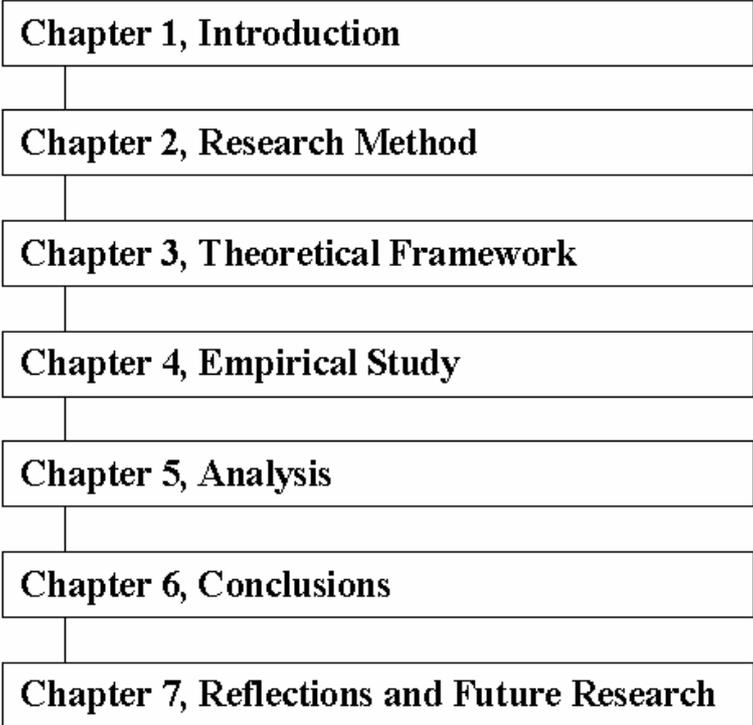
Chapter 1, Introduction

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FIGURE1: STRUCTURE OF THE THESIS

# 2. Research methods

*In this chapter I first present the different research approaches and my attitudes towards using them in this study. Thereafter I present the different methods that are used to gather data and how those methods have affected the research's credibility.*

## 2.1 Research approach

There are two main orientations to research, which are distinguished as follows. Positivism, which is closely linked with quantitative research while post positivism or hermeneutics, is closely linked with qualitative research. (Merriam, 1998)

### 2.1.1 Positivism

Positivism is a branch of philosophy founded by the French philosopher and sociologist Auguste Comte (1798-1857). It is a form of naturalism, which emphasizes that science is the only knowledge that is exact and ultimate. Further it says, that traditional subjects such as aesthetics and metaphysics have no validity because their content cannot be subjected to verification. Therefore, positivism lays the ground for quantitative research methods. (Thurén, 1991)

Through this philosophical approach to research the researcher tries to base all empirical knowledge on perceptual experience and not on intuition or revelation. This is very valuable in order to reproduce reality as it is. To succeed with this goal a researcher should try to be neutral, impartial and try to act only as an observer as much as possible. (Thurén, 1991)

According to positivism, truth can be obtained in the following way. Once you take away uncertain facts about a phenomenon, the remaining knowledge is considered as certain knowledge or hard data. (Thurén, 1991)

In positivism morals and ethics are treated in the following way. The investigator or researcher should not manipulate the research findings to match with his/her own morals and ethics, the reason being that morals and ethics depend on feelings while judgments depend on observations. If one can keep away from values then one can say that the result is true and correct. (Thurén, 1991)

### 2.1.2 Hermeneuticism

Hermeneutic is considered as the exact opposite to positivism. The main aim of hermeneutic is to interpret and understand. This lays ground for the qualitative research methods. The goal of hermeneutic is to study a phenomenon and try to understand how people experience it and how it affects the decisions and actions that they take. (Lundahl and Skärvad, 1999)

In this approach you don't consider that there is a definite truth. Every perception is built on different forms of knowledge for example theory, experience, insight, etcetera. Perception and experience go hand in hand. Perception gets renewed with new experiences and the renewed perception gives way to new experiences. This is called the hermeneutic spiral. (Lundahl and Skärvad, 1999)

### 2.1.3 Research strategy

Generally, when you talk about research strategy you talk about two types of research strategies, namely positivism and hermeneutic. I have chosen to take the hermeneutic approach in this thesis because it gives me a broader spectrum to come up with valuable and interesting results. This thesis is based primarily on two key terms of hermeneutic, to be precise, perception and interpretation. Therefore, I will not attempt to find absolute truths, but instead I will try to understand and interpret the interviewees´ perspectives towards reality.

## 2.2 Qualitative research

The aim of qualitative research is to describe, analyze and understand different behaviors of individuals or groups in a study object. This is done by drawing conclusions from qualitative analysis and mainly qualitative data. Furthermore, focus is given to interpretation of the studied phenomenon. (Lundahl and Skärvad, 1999)

Merriam (1998) says that in qualitative research, an important assumption has to be made, which is: meaning lies in people's experiences and that this meaning is mediated through the investigator's own perceptions. Furthermore, there are certain characteristics in all forms of research. The most important of them is great effort has to be made to understand the phenomenon of interest from the participant's perspectives. A second characteristic is that the researcher is the primary instrument for data collection and analysis. Data are mediated trough the researcher rather than through some questionnaire or computer. A researcher can be differentiated from other data collection methods due to certain characteristics such as, a researcher is responsive to the context, can adapt to situations and can process data immediately. A third feature is that fieldwork is usually involved in qualitative research. The researcher must physically go to the site or organization in order to study behavior or do an interview. Another characteristic is that qualitative research mainly applies an inductive research strategy. That is this type of research builds abstractions, concepts or hypotheses. Often qualitative studies are undertaken because there is lack of theory or existing theory fails to satisfactorily explain a phenomenon. These types of research are built upon data gathered through observations and intuitive understanding gained in the fieldwork. Another feature is since qualitative research focuses on process, meaning and understanding, the product of a qualitative study is very descriptive. In addition, data in the form of participant's own words, direct citations from documents are being incorporated to support the findings of the study. (Merriam, 1998)

Lundahl and Skärvad (1999) suggest that when carrying out qualitative studies it is suitable to study how the study object develops or changes over time. The investigator should try to avoid planning detail or pre-structured studies, instead he should be prepared to make changes and adjustments to the question statement, methods during the investigation process. (Lundahl and Skärvad, 1999)

## 2.3 Data collection methods

Data can be collected mainly through documents and people. Some examples for documents are books, articles, research studies, radio, television etc. The other method is using people, which is done through interviews, questionnaires, and observations. Data collected through the Internet can be considered as a combination of both the above-mentioned methods. (Lundahl and Skärvad, 1999)

**2.3.1 Interviews**
Interviewing is the most common method used for data collecting in almost all forms of qualitative research. It happens often in the form of person-to-person encounters. In addition interviews can take place via telephone or e-mail. In this process one person elicits information from the other, which can also be considered as a conversation with a purpose. The main objective or the purpose is to obtain a special kind of information.
 (Merriam, 1998)

Interviewing is a successful way of gathering information when it's difficult to observe behaviour or feelings or how people interact with the rest of the world also when we are interested in past events that are impossible to replicate. (Merriam, 1998)

One of the most important sources of case study information is the interview. In case studies interviews will appear to be guided conversations rather than structured queries. In other words, although you will be pursuing a consistent line of inquiry, your actual stream of questions in a case study interview is likely to be fluid rather than rigid. This means that throughout the interview process you have to follow your own line of inquiry as reflected by your case study and to ask your actual questions in an unbiased manner. Thus case study interviews require you to operate on two levels at the same time satisfying the needs of your line of inquiry while simultaneously putting forth "friendly" and "nonthreatening" questions in your open- ended interviews. As a result most case study interviews are often open-ended nature, in which you can ask key respondents about the facts of a matter as well as their opinions about events. In some situations you may even ask the respondent to propose his or her own insights into certain occurrences. (Yin, 2003)

I chose interviews as the method for gathering information. The reason is to give the respondents more freedom to express their thoughts and opinions. I could have used a questionnaire instead but then the answers would be more fixed and short, with very little space for explanations. Further I carried out semi-structured interviews. The idea was to partly help me as a guide to lead the interview in the right direction in other words, to help me to get sufficient information on the areas of interest to me. The other reason is to have the possibility to ask resulting questions to get a better understanding of a certain fact. I carried out the interviews in Swedish but I gave them the option to answer in either Swedish or English at the beginning of each interview.

I carried out personal interviews in the respondents working environment. In order to minimize the respondents being disturbed I booked time with them in advance. In this way I managed to capture the respondents feelings and expressions as well, which helped me to build a better understanding of the studied area. In order to complete the missing data I had to contact the respondents by telephone and e-mail. Further, the IT manager referred me to a very resourceful IBS Web site.

**2.3.2 Key informants**
Key informants are very vital to the success of a case study. They provide the case study investigator with insights into a matter. Such persons can also suggest sources of corroboratory or contrary evidence to the investigator and also initiate the access to such sources. At the same time the case study investigator has to be cautious about becoming overly dependent on a key informant. A realistic way of dealing with this pitfall is to rely on other sources of evidence such as documentation (administrative documents, newspaper

clippings) and archival records (survey data, organizational records) on the studied area. (Yin, 2003)

I got very valuable help from the receptionist at Expert Invest AB to come in contact with the IT manager. Since I had very limited time I was compelled to limit my interviews to only the IT manager and managers of the retail stores. The reason why I chose to interview the IT manager and the two retail stores is to get a better understanding, in other words try to capture if possible any similarities or differences in opinions on certain aspects on the area of study. I prepared two sets of interview questions of which one was to the IT manager and the other was to the managers of the retail stores.

The respodentans' I interviewed have a lot of interest, knowledge and experience. Mr. Hans Nöjd is the present IT manager at Expert Invest AB. He has been working in this position for the past 3 years. Mr. Johan Fredriksson is the owner and manager of Expert Rolfs Ljud & Bild, Linköping and has worked in this branch for the past 17 years. Mr. Joachim Gustafsson is the manager of Expert Ikanohuset, Linköping. He has worked for the past 4 years. However it was very difficult to reserve time with the key informants, as they were very busy. Even though I planned to interview all 4 managers of the 4 retail stores in Linköping I managed to interview only 2 of them as the other 2 resisted due to lack of time for them.

## 2.4 Data types

Data that are gathered can be categorized into two types according to the way they are gathered namely, primary data and secondary data. Data that is collected by the researcher himself/herself through interviews, questionnaires, and observations are known as primary data. Data that is collected through documents such as books, articles, Internet are considered as secondary data. (Lundahl and Skärvad, 1999)

Most of the information that is presented in the empirical chapter is based on primary data. These primary data were gathered from the interviews I carried out with the IT manager at Expert Invest AB and managers of two expert stores in Linköping. Some empirical data belong to secondary data because I gathered them from Experts home page and the IBS home page.

## 2.5 Case study

The case study is a form of qualitative research. Case studies give intensive descriptions and analyses a single unit or bounded system such as an individual, event, group or community. This is used when an in-depth understanding and meaning of a certain situation is needed. In case studies interest is laid in process rather than outcomes, in context rather than a specific variable, in discovering rather than confirmation. I have used the interview method to collect data. (Merriam, 1998)

## 2.6 Method critique

According to Lundahl and Skärvad (1999) the different methods an investigator uses for example the problem statements, the key issues and phenomena, theories and models used, the ways of analyzing the collected data and the way they are presented are all influenced by the investigators values and beliefs. Therefore, it is impossible for the investigator to be objective but should try as much as possible.

### 2.6.1 Reliability

What is meant by reliability is to make sure that if a later investigator followed the same procedures as described by an earlier investigator and conducted the same case study all over again, the later investigator should arrive at the same findings and conclusions. The objective of this is to minimize the errors and biases in a study. (Yin, 2003)

Even though I try to be as objective as possible there is a possibility of my analysis being affected by my perceptions. Therefore there is a definite possibility, if this same study is done again that it will not be possible to obtain the same results.

### 2.6.2 Validity

Validity can be divided into internal and external validity. Internal validity deals with the question of how research findings match reality. How congruent are the findings with reality? Do the findings capture what is really there? Internal validity in all research thus deals with reality. Merriam as well as the literature on qualitative research, says that there are six basic strategies to increase internal validity. One of them is triangulation. External validity is concerned with the extent to which the findings of one study can be applied to other situations. That is, how generalizable are the results of a research study? (Merriam, 1998)

I did not interview employees of the retail stores, instead I interviewed only the managers of the retail stores due to lack of time. Therefore the studies validity can be questioned because the opinions and attitudes of the employees are not revealed.

## 2.7 Reference critique

Articles from the Internet and literature from the library have laid the foundation for the theoretical framework. Even though the Internet is considered as a bad reference source I was compelled to use it in order to find up to date information on system integration developments since books written on this subject don't often contain information on the latest developments or findings.

# 3. Theoretical framework

*In this chapter I have presented theories that are relevant for the empirical study. The aim is to give the reader an understanding of the importance of system integration to organizations, the underlying technologies used in system integration and also to describe the effects, which can arise in organizations due to new technologies.*

## 3.1 Importance of usability

The aim of using various information technologies is to make work easier for the users and thereby increase efficiency and productivity. Earlier it was thought efficiency and productivity could be obtained by maintaining a substantial amount of functionality, for example a program which contains all the necessary functions needed to solve a given task. However this is not enough, it is very important that usability is also present in order to increase productivity. In other words, even if a program has good functionality it is of no use if it cannot be used in an effective way. A program's usability is decided mainly by the following 4 factors. They are adaptability, user friendliness, user acceptance and user knowledge. Even small upgradings in the usability can bring about major economic savings and profits and also higher work satisfaction for the users. This also contributes to increase the lifetime of the system, although this is also determined by many other factors. (Allwood, 1998)

### 3.1.1 User acceptance

A user's acceptance of an information system and computerized processes is dependent on how far the user experiences the system as a threat or an asset. An example of a system being considered as a threat to the user is if the user feels that the system is going to take away his or her job due to computerization. On the other hand, a system can be considered as an asset by the user if his/her work is going to be made easier and more effective due to computerization and if it helps to raise his/her status. (Allwood, 1998)

It is necessary that the users have a positive attitude towards the system and that they have trust in the system. This is considered as one of the most important features by some researchers. If the users do not have a positive attitude towards the system there is the risk that they don't learn it the right way or even if they know how to use it they don't use it properly or in the way it should be used to get the maximum use of it. Otherwise, it can lead to unnecessary mistakes and delays. (Allwood, 1998)

### 3.1.2 User knowledge

This means that the user has the required amount of knowledge and understanding to interact with the system in the expected manner so that it leads to increased efficiency. However, often the training that is given to the users is insufficient and rather ineffective. (Allwood, 1998)

Users develop different practices to interact with the system. Some of these practices will lead to the use of only some parts of the system which means that the maximum use of the system is not obtained. Therefore it is important that the system is user friendly as well as the employees are given sufficient knowledge or training on how to use the system the intended way. (Axelsson, 1998)

### 3.1.3 Adaptability

Adaptability means that the system functions are designed in such a way that the user can carry out a task in the best possible way. Generally, it is much easier to develop systems for specific work environments as the natures of the tasks are often more clear. (Allwood, 1998)

### 3.1.4 User friendliness

A primary aspect in user friendliness is access. The users need to have access to a program to use it, as well as access to a terminal or a computer, the main computer must be functioning and the response time must not be too long. Often a user must finish a task at a specific time. If the person cannot trust a computer the person is sure to go and find some other way to accomplish it. (Allwood, 1998)

Computer users are different. Even though there are many things, which are common for different people's ways of functioning physically, psychologically there are many things that are different. Therefore it is better if a program gives support for different types of users to integrate with the program. In other words the program has to put requirements on the users that are compatible and give support for the users' ways of functioning mentally. Then there is a greater chance for it to be suitable for the individual user. Individualising is therefore an important aspect of user friendliness. (Allwood, 1998)

Another important aspect of user friendliness is the quality of the help resources, which are available for the user. When a user is in trouble there should be enough effective help resources available. Some of the most important help resources are other users, paper documents, program help functions and other programs and program functions of supportive character. (Allwood, 1998)

## 3.2 Effects of Information Technology (IT) on organizations

In all organizations there is a working environment which consists mainly of people and the artefacts they use. Further, the aim of all organizations is to achieve goals, the most common being profitability and efficiency. In order to achieve these goals organizations use various strategies. However, these strategies affect the organizations working environment and their employees. Further, Information technologies affect the daily work activities of an organization and the way they are carried out. They also affect the employees of the organization and their relationships with each other. In other words, new contacts are created between people and groups, which results in changed status and power in organizations. (Axelsson, 1998)

According to Zuboff (1988) information technology can be characterized by a fundamental duality, which means it has the power of automating as well as informating. In other words work processes that were carried out with the help of human work force are replaced with technology that performs the same processes with more continuity, and control. At the same time information technology generates information about the underlying productive and administrative processes, which Zuboff refers to as informate. This provides deeper level of transparency to activities that had been partially or completely invisible in an organization. (Zuboff, 1988)

Informating is derived from and builds upon automation. It is quite possible to proceed with automation without referencing to how it will contribute to the technologies informating potential. When this occurs informating is considered as an unintended consequence of

automation. Zuboff (1988) believes that much work can be automated through IT. This in turn leads to less need of human skills to carry out work processes in organizations. In other words, much work can be done with machines/computers and software while decreasing the dependence on human skills. (Zuboff, 1988)

The informating capacity of the new computer based technologies brings about radical changes as it has the potential to alter the basic character of work. According to Groth (1999), as work is increasingly informated and more and more routine tasks are either automated or eliminated the remaining work will to a large degree be conducted onscreen. It will require a fairly advanced ability to think abstractly, understand symbols and work through symbol manipulation. (Groth, 1999)

Due to IT work becomes more abstract, intelligence is programmed to a great extent, organizational memory and visibility increases. Zuboff (1988) says, that although technology has the power to redefine possibilities it does not have the ability to determine which choices should be taken up and for what purpose. (Zuboff, 1988)

Zuboff (1988) also states that informating aspect support existing work improvement efforts such as increases commitment, participation and decentralization. Managing an informated environment is a delicate human process. For example one needs to have commitment and cooperation to use information for business needs and to succeed with this one needs intellective skills. (Zuboff, 1988)

Zuboff (1988) argues that information technology has to be treated in a broader manner which means attention has to be given to both automating and infomating aspects in order to draw maximum benefits of the technology. When focus is given to automating aspect it will lead to automating of work process while decreasing the dependence on human skills. When focus is given to the informating aspect it becomes possible to access, share and coordinate information giving opportunity to use information for a variety of analytical efforts and decision making. (Zuboff, 1988)

## 3.3 System integration

System integration can be defined in many ways. The following are some definitions from a technological perspective.

*"System integration is the melding of divergent and often incompatible technologies, applications, data and communications into a uniform information technology architecture and functioning working structure". (Myerson, 2002, s. 6)*

*" integration technologies enable an organization's IT infrastructure and applications to rapidly respond to business changes by providing a dynamic way to streamline, integrate, and manage previously independent business processes".( InterSystems Corporation, 2004)*

Myerson (2002) states that, at present reality are such that integration involves many aspects of technology and organizational processes and those integration solutions for one company may not be suitable for another. (Myerson, 2002)

## 3.4 System integration eras

According to Johnson (2002) there are four integration eras. First there were the "stovepipe" systems. They were isolated systems that had little need to communicate with their neighbouring systems and were ill equipped to do so but they contained very valuable organizational data. They are also known as legacy systems. If the output from one system occasionally was needed in another, the information transfer was carried out manually. (Johnson, 2002),

As the companies automated their business and more information was digitalized, this approach, however, became inefficient. Systems that needed to communicate were then integrated if possible. This was the point-to-point era. As the point-to-point approach was adopted, however, it became clear that the cost for system integration was high, in many cases too high even to consider using the method. Furthermore, when the enterprise software system grew in size it started becoming difficult to manage with many customized connections between systems. (Johnson, 2002)

In order to reduce the complexity of the enterprise software systems, the Enterprise Resource Planning (ERP) systems were introduced. After studying the similarities of most computerized company vendors such as SAP and Baan started offering giant systems, covering many of the functions that previously needed to be done separately. A main benefit of the ERP systems, from an architectural point of view, was that the components/systems were developed by one vendor, and prepared for integration with each other. This was the ERP era. Due to many reasons such as poor adaptation to organizational needs many ERP implementation projects failed. (Johnson, 2002)

Now the excitement is for Enterprise Application Integration (EAI) solutions, including message brokers, etcetera. These products are specifically designed for facilitating the integration of the above mentioned legacy systems and ERP systems. This is thus called the EAI era. At present most of the companies have systems belonging to all the above stated eras and very few have managed to fit themselves into one specific era. (Johnson, 2002)

## 3.5 System integration architectures

Point to point and EAI system integration architectures are presented in detail below as they have much relevance to this thesis.

### 3.5.1 Point to point integration

In order to get two independent systems to communicate with each other connectors have to be built which can translate data structures from one system to another. In a point-to-point architecture, integrating systems requires integration code for each interface. When any changes happen in either application A or B, the interface programs must be updated and changed (see figure 2). Further, application integration becomes increasingly difficult as new applications are added to the environment. For every new system added, it is necessary for it to create connection point interfaces with each existing system that it is connected with. As a result the integration solution grows in complexity and becomes hard to manage in the long run. (Travis & Ozkan, 2002)
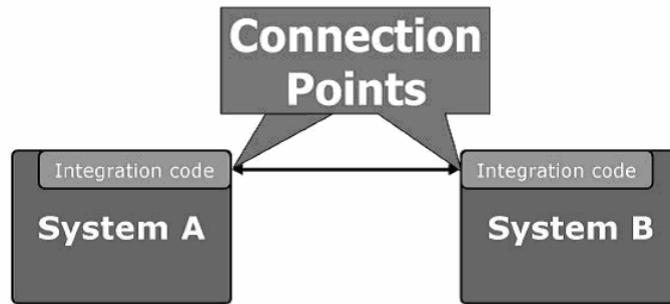
### 3.5.2 EAI (Enterprise application integration)

Enterprises try to share data and processes without making comprehensive changes to the applications or data structures and also decrease the number of interface points. This is made possible by EAI architecture. Presented below are some definitions of EAI.

*"EAI is the unrestricted sharing of data and business processes among any connected applications and data sources in the enterprise" (Linthicum, 2000, s.3)*

"Enterprise Application integration is the creation of business solutions by combining applications using middleware."(Ruh et al., 2001, s.2)
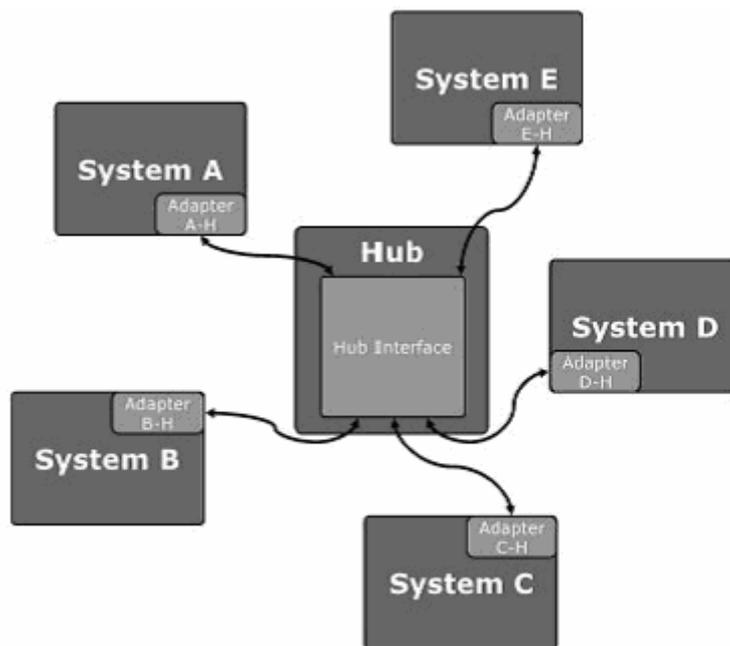


FIGURE 3: THE HUB MODEL (TRAVIS & OZKAN, 2002)

The EAI architecture uses a central system (middleware) called a "hub", as it sits in the centre. In this method, instead of the requestor application communicating with the respondent, the requestor communicates with the hub application, which in turn communicates with the respondent application (see figure 3). (Travis & Ozkan, 2002)

When application A wants data from application B, A sends the request to the hub application using the hub application's language. The hub translates the request and sends it to application B, which takes the request and converts to its own format. The adapter on A understands only its language and the hub application's language. In the same manner, the adapter on B understands only its language and the hub's language. (Travis & Ozkan, 2002)

### 3.5.3 Middleware
Middleware is basically any type of software that facilitates communications between two or more software systems. This is accomplished by providing common interfaces, which in turn enables all integrated applications to pass messages to each other. These are mostly used for moving information between applications and databases. An example of such middleware is a message broker. (Linthicum, 2000)

## 3.6 System integration and organizations

Organizations' consist of people performing processes and these processes and people are supported by technology in order to create and deliver services and products to customers (see Figure 4). Furthermore, organizations consist of different departments or sub units, which integrate with each other. In addition, organizations integrate with other organizations to form larger integrated organizations. (Kosanke et al., 2002)
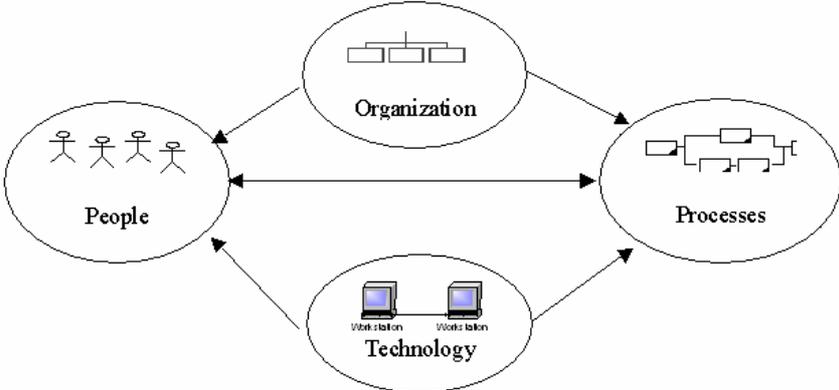


FIGURE 4: COMPOSITION OF AN ENTERPRISE. (KOSANKE ET AL., 2002)

### 3.6.1 Importance of system integrations to organizations
Organizations have applications and data that belong to different computational generations, written using different programming languages, which use different vocabularies and syntax rules, data types, and many other incompatibilities. Therefore these applications cannot integrate with each other. As a result very vital and valuable data of organizations are held hostage. (Travis & Ozkan, 2002)

Integration solutions are used to unlock existing information assets in systems and share them across multiple applications and business processes. Integration solutions also facilitate organizations to create an infrastructure so that applications can exchange and update business-critical data no matter where they reside. (InterSystems Corporation, 2004)

### 3.6.2 Benefits to organizations from system integration

There are several benefits of using integration solutions to organizations. The most important benefits being increased profitability, decrease in costs and increased efficiency. Integration solutions facilitate the use of data and functionality embodied in the organizations existing applications or legacy systems instead of replacing them with new systems. They also bring about benefits in the long run as well, for example organizations can gain an instant, real-time view of all their data and operations, which can lead to better decision-making. They also provide the flexibility to quickly adapt business processes to accommodate growth and meet new business challenges as they arise. (Intersystem Corporation, 2004)

Kosanke et al. (2002) present some of the areas of organizations which can be affected and the effects that can be brought about through system integration. They are as follows:

- Enterprise Reengineering / Process Improvement (establishing the business-process map, simplifying and re-organising some processes, optimising use of resources, simulating enterprise behaviour)
- Workflow design and management (automate critical processes)
- Improve enterprise performances (mostly in terms of costs and delays but also quality, reactivity and responsiveness)
- Management decision support (simulating of planned situations, forecasting etcetera)
- Enterprise integration (seamless exchange across the systems to provide the right information at the right place at the right time).

(Kosanke et al., 2002)

# 4. Empirical study

*This chapter begins with a brief description of the organization, Expert. Thereafter the empirical data, which were collected through the interviews, are presented.*

## 4.1 Expert

Expert is a retailer of consumer electronics, household appliances, personal communication, photo equipment and furniture. The Swedish Expert chain is one of Sweden's largest retail chains in home electronics with 1100 employees in Sweden. It is part of the Expert International organization, which has over 7400 retail shops in 22 European countries, and the United States, South America and Australia. All countries operate autonomously. (Expert, 2001-2005)

The company's vision is to deliver high quality electronic products to customers and provide knowledgeable advice and after sales service. The central organization in Sweden consists of Expert Invest AB and Expert Konto AB. Expert Invest AB is responsible for all concept developing, profiling, new establishments, recruiting, training and educating personnel in handling stores and logistic data systems, planning marketing strategies, buying and distribution of products. In addition it provides support and advice on economical and administrative matters to the stores. Expert Konto AB is responsible for managing consumer credits and developing and operating of Expert card. (See appendix 3 and 4) (Expert, 2001-2005)

There are 230 Expert retail stores, which are scattered throughout Sweden. Each Expert store operates as a separate business under licence from Expert. The stores use the Expert brand and knowledge, and must purchase a majority of their goods centrally from Expert. There are two retail stores in Stockholm, which act as pilot stores. New products are introduced to the customers for the first time via these stores. (See appendix 3 and 4) (Expert, 2001-2005)

## 4.2 Importance of system integration to Expert

According to the IT manager the main reasons for using system integration are to increase profitability, decrease costs for maintenance and upgrading of different systems, provide salesmen at retail stores possibility to concentrate more on customers by minimising administrative work at the retail stores. The organization has calculated that by using system integration the retail stores can save up to approximately 2 hours per day, which in turn can be used to deliver better service to the customers. It is estimated that a typical shop in the Expert chain has the resources of from 3.5 to 4 years' worth of man-hours, but laborious administrative tasks leave little time for salesmen to concentrate on customers.

The employees needed a system, which effectively provided them with the necessary information. In other words there was necessity for a user-friendly graphical interface, as the employees working in the retail stores simply did not have the time to learn a new IT system.

Further, each Expert store used to have its own IT system, many of them homemade. The amount of information needed to be processed through these systems increased with time and brought about tremendous pressures to the systems. In addition, the retail stores were receiving a steady stream of email, post, faxes and telephone calls from management and

suppliers. These problems created the need for better information channelling and streamlining of work processes.

There are many reasons, which led Expert towards using system integration. The above mentioned ones are some of the main reasons. According to the IT manager, the owners of the retail stores along with their employees felt the need for an IT solution to facilitate the information flow and administrative tasks.

## 4.3 System integration at Expert

According to the IT manager, the technical platform at Expert comprises of many systems. Described below are the systems, which are of main importance to the organization. These systems are developed by different software companies and therefore data cannot be shared among the systems as they use different technologies, and for this reason Expert uses different system integration solutions to connect these systems with each other.

*ASW*
ASW is an ERP system (Enterprise Resource Planning system) developed by IBS (International Business Systems). Expert uses the following modules of ASW. They are finance, asset control, distribution, inventory control, warehouse management, analyzer, sales and marketing support. The system manages item data, retail stores register and Expert card. Each item is given a unique item number by the system. (See appendix 5)

*BD900*
This system is developed by ADS anker systems and is used by all the retail stores for selling purposes such as payment operations, finding out prices and stock levels, purchasing and ordering of items etc. The following software products are used in the terminals. They are Citrix terminal server, Microsoft windows operating system (XP), Microsoft office, Outlook and windows Explorer. (See appendix 5)

*Expert.se*
This is the organization's website. Information can be found on products in both text and picture form. There is also information on concessions, special offers, newsletters, Expert card, competitions, customer support, etcetera. (See appendix 5)

*Picture bank (Bildbank)*
All product data and pictures are stored here. Expert .se can access data from picture bank. This is also located at the central organization. (See appendix 5)

*eXnet*
eXnet is Expert's intranet which is developed by Tankbar and provides the retail stores with company information such as product catalogue, campaigns, system information. (See appendix 5)

ASW is connected with all the BD900 in the retail stores in order to provide them with information on items, expert cards, retail store registers. eXnet is also connected to BD900 in the retail stores and provide information on product catalogues, campaigns, retail store registers and ordering functions. Expert.se is connected to picture bank. It is a system which provides information on city maps and Fuji digital photo developing centre, which is a system handling digital photos. File transferring between the above systems is done by FTP (File Transfer Protocol) commands. (See appendix 5)

### 4.3.1 Point to point architecture

The IT manager stated that at present point-to-point system integration method is used widely in the organization (see Figure 5). By using point-to-point integration architecture pictures/photos are transferred from photo bank (Bildbank) to Expert.se. Further, this architecture is used when transactions take place using credit cards and bankcards. However, the organization states that point-to-point method is very costly. For example if the organization wishes to add a new feature to the existing information system, changes have to be made in all systems which are integrated with each other.
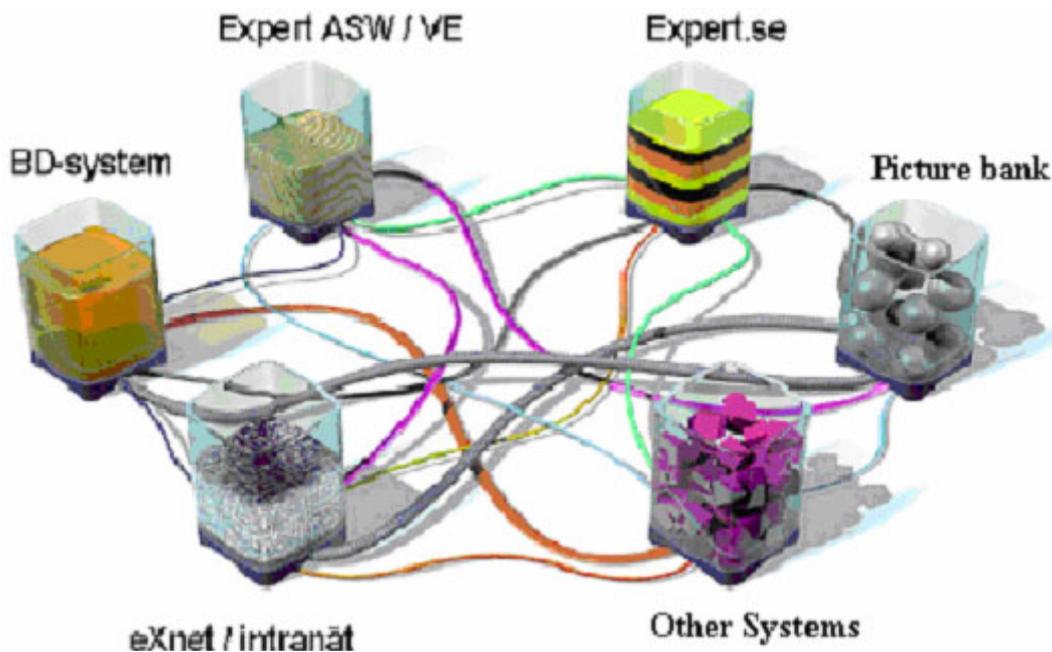


FIGURE 5: POINT-TO-POINT INTEGRATION SOLUTION AT EXPERT (PERSONAL COMMUNICATION)

### 4.3.2 EAI architecture

Expert is gradually moving towards EAI architecture. Already it is used partially among the following systems, namely Expert.se, Bildbank, ASW and eXnet. Figure 6 depicts the organizations intended system integration solution.
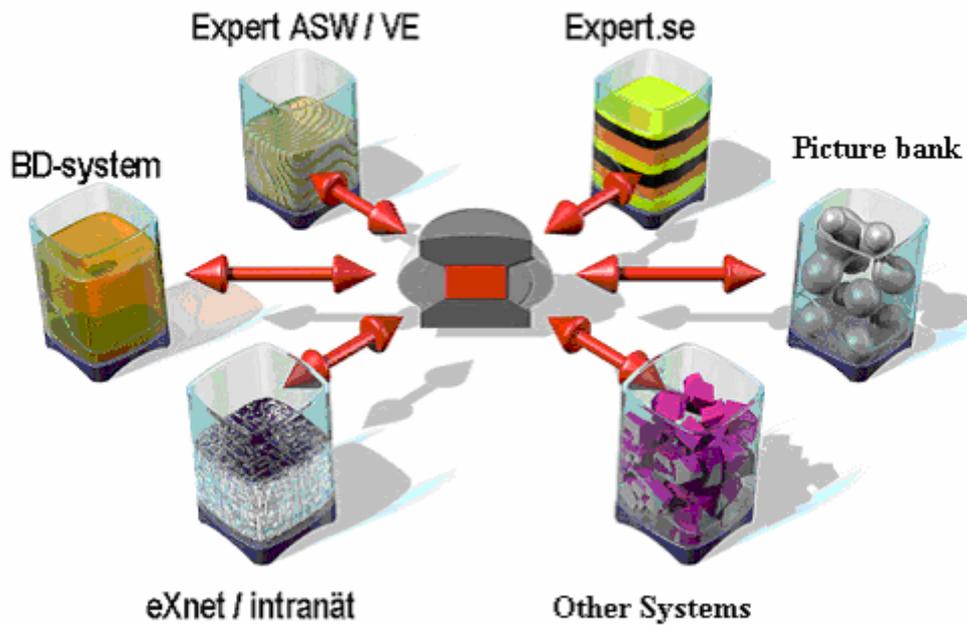
### 4.3.3 Business Intelligence

This is a software tool developed by IBS to support the distribution of goods between the retail stores. It helps accessing, transforming, cleaning and storing of data, which come from multiple sources. The stored data can be analyzed, saved or exported to standardized formats. Further, this tool provides the possibility to import external data and is easy to work with. (IBS, 2005)

## 4.4 Effects of system integration at Expert

The different system integration solutions used by Expert have affected the retail stores in many ways. In other words, work processes and employees have been affected both positively and negatively.

### 4.4.1 Effects on retail stores' work processes

Both managers of the retail stores stated that by using the IT system they are able to get item information such as item name, item price, amount in the stocks etcetera much easier than before. Further, if an item is out of stock they are able to place an order or check the status of an ordered item, for example when it is due to arrive, how many items will be delivered etcetera. Earlier they had to call the suppliers or Expert's central warehouse.

Both managers at the retail stores stated that paper work has not been reduced instead it has been increased. They take printouts of all vital information as a security measure to avoid valuable data being destroyed, for example during a power failure. Printouts are taken when item deliveries take place to the stores from the warehouse, mobile subscriptions etcetera.

The managers said that the system helps them by checking whether a customer's credit card is valid or not, whether the customer is eligible to buy items on credit or not, whether there is money in a customer's bank card or not. Earlier they had to telephone and check under certain circumstances to for example American express, Babs, Finax etcetera.

The Expert retail store at Ikanohuset belonged to a sub Expert retail chain. In other words a certain number of Expert retail stores belonged to a single owner. Therefore the stores in the chain can communicate with each other. This is useful for example if an item is out of stocks in one retail store, it can be ordered from another retail store in the chain.

The managers said that still some work processes are not supported by system integration, but instead they are done manually, for example handling of invoices and item rejections. They also wish they could send expert bonus cards to Expert Konto instead of sending them via internal post.

**4.4.2 Effects on retail stores' employees**
Both managers of the retail stores think handling the system is quite easy and also it is easy to learn for a new employee. They think that basic computer knowledge, which is given in schools, is sufficient to use the system at the retail stores. One of them said that before new employees start working with the system they are given a short training course.

The managers of the retail stores stated that they are quite satisfied with the current facilities rendered by the IT system. Further they stated that the system has not caused any special stress for them. However if an item is labelled with a wrong item number it can create problems, and therefore special attention has to be paid in order to make sure the item number of the product is identical to that of the system (every item is given a unique item number by the system). However, the general opinion is that work has become easier for the employees due to the latest upgrading of the system.

The two retail store managers had two completely different opinions on the system's reliability. One was quite satisfied with the systems reliability while the other was quite doubtful about it. Both of the retail stores' managers were pleased with the fact that the system supports them to get the actual stock status of every item in the store. Earlier they had to count the amount of each item manually. The system calculates the amount of each item automatically, which earlier had to be done manually.

Further, the managers are pleased with the fact that they can get real time information from suppliers, the central organization and other partners. Earlier they had used the telephone, fax, post and emails. Now they are able to find out information about the different campaigns that were held in the past, that are to come in the future. For example service agreements with the suppliers and product information from suppliers.

The managers said that the system helps the salesmen to find out latest news on new items, campaigns. This also helps them to have closer contacts with the central organization and get information and training

Further, they said they are able to find out how many items have been sold under a certain period. How much they have earned per day, week or month. How much they have sold from a certain item.

They said it is possible for them to give customers information on products faster and more accurately, for example to give information on current prices of items before placing an order for it. Further, the salesmen are able to get information on suppliers, such as information on service agreements with the suppliers, information on supplier products etcetera. Earlier they had to send faxes, letters or make telephone calls.

# 5. Analysis and discussion

*In this chapter I analyse the data gathered from the empirical study with the help of the theory presented in the theoretical framework. Further, I will expose my personal opinions and thoughts as well along with the analysis.*

## 5.1 Effects on work processes

According to Axelsson (1998), organization's work activities are affected by new technologies or changes in them such as changes in information systems. This phenomen can be recognized at expert retail stores. The work processes at the expert retail stores have been affected by system integration giving rise to both positive and negative effects. Due to system integration, work has become easier, more effective and interesting for workers.

Johnson (2002) says that, an organization's information systems often consist of many sub systems and that they often belong to different computational eras. In the same way the Expert information system comprises of many different sub systems, developed by different software companies using different technologies.

Due to system integration work processes at the Expert retail stores have become automated. Even Kosanke et al. (2002) states that, system integration tools support work processes to be automated. For example earlier stores had to count manually the amount of each item in the store but now the system updates stock levels of items in the stores automatically.

It is said that different information technologies have the power of automating core business processes of organizations, while at the same time informating organizations (Zuboff, 1988). The salesmen at the retail stores and the central organization are quite aware of how to take advantage of the informating aspect of system integration. One such example is that Expert uses customer statistics for target marketing. In Zuboff's (1988) view, informating is one of the best ways to achieve maximum benefit from any information technology. Further, due to informating an organization and its internal processes, relationships become visible in an entirely new way. Expert retail stores have also experienced this phenomenon because of system integration. Therefore they are able to get different types of statistics on sales, prices of items, stock status and whether items are found elsewhere etcetera.

According to Zuboff (1988), earlier generations of machines tended to decrease the complexity and substantive content of work tasks, making it possible to employ people with lower levels of skills and wages. In contrast, information technologies frequently increase the complexity and intellectual context of work at all levels of the organization. Even Groth (1999) says this. I expected to find this being true but found that it was not so at Expert as special knowledge or extensive training was not required from the employees to handle the systems. One of the reasons I believe is because the systems are made user friendly and special attention is given to usability.

In Allwood's (1998) view, it is very important that the users are satisfied with a system or have good acceptance of a system. Therefore measures have to be taken to make a system user friendly (Allwood, 1998). There seems to exist a positive acceptance from the employees towards the system at the retail stores. This is because the system supports the employees with real time information, gives better access to information and etcetera. Further the employees

see the system as an asset and not as a threat. I feel their user-friendly graphical interface also plays an important role here.

Zuboff (1988) says that, the use of IT results in automation of work processes. This in turn results in decreased demand for human skills. This fact is seen at Expert. Automation has led to decrease in the use of human skills for administrative work. However, Expert has done this intentionally. When Expert is concerned one of the main goals of system integration was to automate many administrative processes and thereby free up salesmen time to be utilized to deliver better service to customers. Therefore automation of work processes has not resulted in decreasing the number of employees from the retail stores but instead streamlining of employees' responsibilities and tasks.

Even though technology has the power to redefine possibilities, it is humans who decide which choices should be taken and for what purpose (Zuboff, 1988). This fact applies to Expert as well, that is, even though system integration has provided the retail stores with various possibilities, it is still the employees who make the final decisions. For example, if an item is out of stock it is the employees who decide how much should be ordered and when it is ordered.  According to Zuboff (1988), the informating aspect of IT leads to improvement of work efforts.  When I interviewed the expert retail store managers they had a positive attitude towards the system upgrading and said that they get good assistance from the system to carry out work effectively. They also said that all of the employees have access to most of the information in the system as well.

## 5.2 Effects on employees

Axelsson (1998) says that, even employees of organizatons are affected by these changes and result in the formation of new social relationships and changes in social status and power. Through system integration Expert has achieved to automate many administrative tasks. As a result salesmen have got more time to concentrate on their customers. This has led to the forming of new relationships with new customers or strengthening relationships with existing customers.

According to Allwood (1998), usability is an important factor needed to achieve maximum benefits of an information system. This is because it is found that even if a system contains all the needed functions, if it is not used in the proper way, the expected efficiency cannot be achieved. Expert seems to be quite aware of these aspects as the employees had a positive attitude towards the system, which shows there is positive user acceptance. Further, the employees are informed and educated when new features are added to the system mostly via intranet by the central organization, which shows that genuine efforts are being made to provide users with relevant knowledge of the system to use the system in the right way. Further, the managers of the expert retail stores stated that the salesmen at the retail stores have been provided with easy to use graphical interfaces, which are user friendly. Therefore, the salesmen are able to use the system without much trouble. They need not have special computer knowledge to use the system. Basic knowledge in computer handling is enough. For new workers there is a training system before you start working with the new system. It is easy to learn the system's functions fast and therefore the new salesmen don't have to have any special knowledge of the system.

Zuboff (1988) believes that, much work can be automated through IT. This in turn leads to less need of human skills to carry out work processes in organizations. With the help of system integration the retail stores have succeeded in reducing many administrative tasks or in

other words much administrative work has been automated. Thereby the salesmen at the retail stores are given the possibility to concentrate more on the customers and provide them with better service. Providing high quality service and educating the customers are considered as very important goals for the organization or a part of the company's vision. The managers of the expert retail stores stated that after the latest upgrading of the system it has become possible for the sales personnel at the retail stores to provide customers with up to date information for example whether an item is available, current prices of items, special features of each item, etcetera faster and more accurately than earlier as all such information can be accessed directly. Therefore it is possible to state that system integration has contributed to a great extent to achieve the earlier mentioned goals of the organization.

Zuboff (1988) states that, one need intellective skills such as commitment and cooperation to manage an informated environment. From the interviews I carried out with the managers of the expert retail stores I understood and observed that they had sound knowledge on the work processes in the retail stores, the needs and capabilities of the employees, the benefits and limitations of the information system, the wishes and needs of the customers' etcetera. Therefore it is possible to say that the managers I interviewed possessed the necessary intellective skills to manage the informated environment.

According to InterSystem Corporation (2004,) due to system integration, an organization can exchange and update business critical data independent of geographical location. This is quite true at Expert. Retail stores all over Sweden can access necessary information at all times from the central organization. The company's intranet helps the salesmen to find out the latest news on new items, and campaigns. It also gives them better access to information. For example, they are able to get information on suppliers, such as information on service agreements with the suppliers, information on supplier products etcetera. Earlier they had to send faxes, letters or make telephone calls. Now it is possible to get information about how many articles are in stock, which they earlier had to count by hand. Now such information is registered in the system and counting happens automatically every time a customer purchases an item. This means system integration has decreased such types of manual work. The salesmen are able to provide customers with up to the minute and reliable information within a short span of time as information flows have been improved among the central organization, other retail stores and suppliers through system integration.

According to Allwood (1998), user acceptance of an information system is regarded as very important in order to achieve the expected benefits of a system. From this study I found out that there are different opinions on this issue, the main reason being that the users are still very sceptical about the system integration technology's reliability. It is necessary to take measures to improve user acceptance and user knowledge. In my opinion, lack of user knowledge of a certain information system leads to a decrease in user acceptance. Therefore, necessary steps have to be taken to build user acceptance as well as user knowledge. Otherwise, the risk is high for the users developing a negative attitude towards the system. At the same time it is necessary to carry out a thorough investigation on the matter and try to disclose the reasons behind the problem.

## 5.3 Experiences gathered by the method used for the study

I chose to interview only the managers of the retail stores. This had both positive and negative impacts. I was quite aware of these facts from the beginning. However, since I chose to interview only the managers' of the retail stores it gave me the possibility to gather information on how managers understand the current situation at their retail stores. However,

there is a possibility for the managers' understanding to be different from the employees' that is because each employee often speaks from his or her experiences. Anyhow, I am satisfied with the data I obtained by interviewing the managers of the retail stores. The managers I interviewed had sound knowledge on the functioning of the retail stores, that is the work processes and the work situation of their employees In addition, they were willing to share their experiences with me. This gave me the opportunity to get a general and rather balanced understanding of the work processes and employees' work situation at the retail stores. The reason is that in every retail store about three or four employees work and the managers of the retail stores work very closely with their employees, so therefore the managers have a good understanding of the employees' work situation and the work processes of the retail stores.

At the beginning of the study I considered the possibility of using a quantitative data collection method, namely a questionnaire to be distributed among the employees of the retail stores in order to get a general understanding of their current work situation and the work processes that take place in the retail stores. I am aware of the fact that it would have helped me to get a better understanding. Anyhow, I think that I managed to get a lot of information from the interviews with the managers. I think a questionnaire wouldn't have given the expected depth it would have given only the breadth on the studied area. In addition, even though I came across much interesting empirical data I selected and presented those, which I thought were relevant and necessary for the study.

# 6. Conclusions

*The final conclusions that have been drawn through the analysis are presented in this chapter.*

After carrying out the analysis, I have been able to come to the following conclusions. They are as follows:

The main aim of the study was to find out how the existing system integration solution at Expert has affected the retail stores' work processes and employees. Due to the use of the system integration technologies the expert retail stores' work processes and employees have been affected both positively and negatively but mostly in positive ways. The overall success can depend on many reasons, some of which I think are the intelligence of the system integration technologies as well as the sound knowledge the organization has of its key work processes and employees' needs.

Through system integration the administration work has been automated. In addition there has been a decrease in cash payments and an increase in the use of credit and bank cards and an increase in work related to such transactions. This would have been much more difficult without system integration.

Due to system integration there is increased coordination and better channelling of information in the retail stores. This has led to a decreased use of telephones, faxes and emails since most of the needed information can be accessed directly.

Since the stock status in the warehouse can be known directly through the system, manual counting is no longer necessary which results in a streamlining of employee tasks. However, there are still some activities, which are not facilitated by system integration, leaving space for system integration to be further developed.

The salesmen have more time to spend with the customers as they have less administrative work. Therefore the salesmen are able to build better relationships with the customers and are able to give better service to them. As system integration facilitates direct access to information the salesmen are able give accurate and real time information to customers.

Due to system integration employees of the retail stores have increased access to information. The employees are able to see which items are in stock in the warehouse, order them, and get detailed delivery information in real time.

Since system integration has the ability to informate it has helped Expert and its retail stores to get customer statistics for various decision-making tasks such as target marketing.

However, the salesmen have a quite positive attitude towards the system and feel that it helps them with their work activities. They are also satisfied with the functions provided by the system and consider the system interface as user friendly. This shows that the users have good acceptance towards the system.

# 7. Own reflections and Future research

*In this chapter I share my personal experiences and thoughts on the case study I carried out and suggestions for future research that can be carried out in the area of system integration architectures.*

## 7.1 Reflections on carrying out the study

This project has given me valuable and unforgettable experiences, lessons and memories, which will definitely help me with future studies of this nature. It was very difficult at the beginning to find an organization to carry out my study. After making an endless number of telephone calls I managed to come in contact with Expert. I am quite satisfied with the results I have managed to obtain within this short span of time.

Following are some of the most important lessons I learnt by doing this study and carrying out interviews. It is very important to have a clear idea about what you are going to study and how you find relevant information for the study. When it comes to interviews it is necessary to have experience in interviewing persons in order to get the right information. Questions have to be asked in the right sequence and formed in the right way. Practice is needed to understand and interpret what the informants say. Have a genuine interest and strive at all times to have the right balance and hold on to the main theme. It took me some time to realize the importance of these facts to be precise, I realized these once I did the first interview. It helped me later on to carry out the rest of the interviews.

There are so many books written on different system integration architectures, how they can be implemented in organizations, the problems they can solve and the benefits they give. However, there are very few books that have been written on the effects system integration can bring about in organizations working environments and employees but with the help from my supervisor I managed to find some excellent books.

By carrying out this study I have had the possibility to understand how theory is applied in reality, in my case how the different system integration architectures and technologies are applied in reality, how complex, valuable and powerful system integration solutions are and how difficult and expensive it is to maintain them.

## 7.2 Suggestions for future research

Since the latest system integration developments are quite new to organizations, their effects are still pretty unknown. Therefore, I feel much research has to be carried out to find out how far these system integration technologies live up to their initial promises and how they affect organizations, their structure, work processes and employees. The following are some such suggestions:

- How can managers assure a stable work environment while maximizing profits through system integration?
- In which ways does system integration affect an organization's structure?
- How can employees contribute to develop a suitable system integration solution for their organization?

- How far has system integration technologies succeeded in increasing or assuring security in organizational processes?
- A study can be carried out on this same topic using employees as key informants
- What are the main reasons that lead system integration projects to be unsuccessful?

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visited on 2005-05-05

**Interviewees**
Hans Nöjd, IT manager, Expert Invest AB, Linköping. Interview 17-05-2005, 04.00-06.00
p.m.

Joachim Gustafsson, Manager of Expert Ikanohuset, Linköping. Interview 18-05-2005, 01.00-
2.00 p.m.

Johan Fredriksson, Owner and Manager of Expert Rolfs Ljud & Bild, Linköping. Interview
24-05-2005, 10.00-11.00 a.m.

# Appendix

## Appendix 1: Questions to IT manager at Expert

**Questions in English**

*Background*
- Name?
- How long have you worked in this current position?
- What are your responsibilities?

*Technical aspects*
- Describe the organizations information system.
    - What are the different IT systems/subsystems that are used in your organization?
    - How do they support the expert retail stores?

- Describe the existing system integration solution.
    - *What are the features of it?*
    - What are the technical platforms used in this?
    - How long has this been in use?
    - What sort of goals did you try to achieve through this solution at the beginning?
    - How successful have you been in achieving these goals?
    - What sorts of difficulties are there to achieve these goals?
    - What is your general opinion on this system integration solution?
    - Who developed it?
    - Who is responsible for the maintenance of it?
    - What are the future development plans for this solution?

*Effects to expert retail stores*
- *What sorts of work in the expert retail stores are supported by system integration solution?*
- How were these work done before system integration solution was used?
- What sorts of changes have taken place due to system integration solution in the expert retail stores?
- What are the main advantages and disadvantages to the employees working in the expert retail stores from this system integration solution?
- What are the main advantages and disadvantages to the expert retail stores organizational structure from this system integration solution?
- What are the main demands from the system integration solution to the expert retail stores?
- Are there still work processes that are not supported by the system integration solution? Why?

**Frågor på svenska**

*Bakgrund*
- Namn?
- Hur länge har du haft den här befattningen?
- Vilket ansvar har du?

*Tekniska aspekter*
- Beskriv er informations system
  - Vilka IT system/subsystem används i er organisation?
  - Hur stödjer de expert butikerna?

- Beskriv er befintliga systemintegrations lösning
  - Vilka särdrag har den?
  - Vilka tekniska plattformar använder den?
  - Hur länge har ni använt den?
  - Vilka sorters mål försökte ni uppfylla genom denna lösning?
  - Hur mycket har ni lyckats att uppnå de målen?
  - Vilka svårigheter finns där?
  - Vad är dina allmänna åsikter om denna lösning?
  - Vem utvecklade den?
  - Vem ansvarar för underhållningen av den?
  - Vilka förbättringar kommer att ske till denna lösning i framtiden?

*Effekter till expert butiker*
- För vilka sorters arbete får expert butiker stöd från detta system integrations lösning?
- Hur genomfördes de arbeten innan?
- Vilka sorters förändringar har skett i butikernas verksamhet på grund av denna system integrationslösning?
- Vilka är de viktigaste fördelar och nackdelar till anställda på butikerna av denna lösning?
- Vilka är de viktigaste fördelar och nackdelar till expert butikernas organisations struktur från denna lösning?
- Vilka är de primära kraven från denna lösning till expert butikerna?
- Finns det fortfarande arbetsprocesser som inte stöds av denna lösning? Varför?

## Appendix 2: Questions to managers of Expert retail stores.

**Questions in English**

*Background*
1. Name?
2. How long have you worked in this current position?
3. What are your responsibilities?

*Technical questions*
1. What sorts of IT systems do you use in the store?
2. How important is the IT support to the store?
3. Is there any more IT support that you wish for?
4. How dependent is your store to the central organization for IT support?
5. What sort of IT support do you get from the central organization?

*Functioning of the store*
1. How does this store function?
2. How is this functioning affected by the IT system?

*Workflows in the store*
1. What sorts of workflows are found in your organization?
2. To which extent are these workflows computerized/ integrated?
3. What sort of advantages and disadvantages do you get through computerization of workflows?
4. Are there still work done manually? Why?

*Employees*
1. How many employees work in your store?
2. What sorts of responsibilities do they have?
3. What sorts of support do they get from the IT system to carry out their tasks?
4. Are there certain tasks that have to be carried out by specific employees and what are they?
5. What sorts of knowledge are required from the employees to use the IT system?

**Frågor på svenska**

*Bakgrund*
1. Namn?
2. Hur länge har du haft den här befattningen?
3. Vilket ansvar har du?

*Allmänt*
1. Hur ser er IT system ut?
2. Hur viktigt är IT systemet för butiken?
3. Finns det något mer som önskas av IT systemet?
4. Hur beroende är er butik till den centrala organisationen när det gäller IT stöd?
5. Vilka IT stöd får ni från den centrala organisationen?

*Butikens funktionering*
1. Hur arbetar ni?
2. På vilket sätt är detta arbetssätt påverkad av IT systemet?

*Butikens arbetsflöde*
1. Hur ser butikens arbetsflöden ut?
2. Till vilken grad är de datoriserade/integrerade?
3. Vilka fördelar och nackdelar får man av datoriseringen av arbetsflöden?
4. Finns det fortfarande arbeten som görs manuellt? Varför?

*Anställda*
1. Hur många anställda jobbar I din butik?
2. Vilket ansvar har de?
3. Vilka stöd/fördelar få de från av det befintliga IT systemet?
4. Har alla anställda behörighet att använda alla delar i IT systemet?
5. Vilka kunskaper behöver anställda för att använda IT systemet?

**Appendix 3: Expert ownership structure**
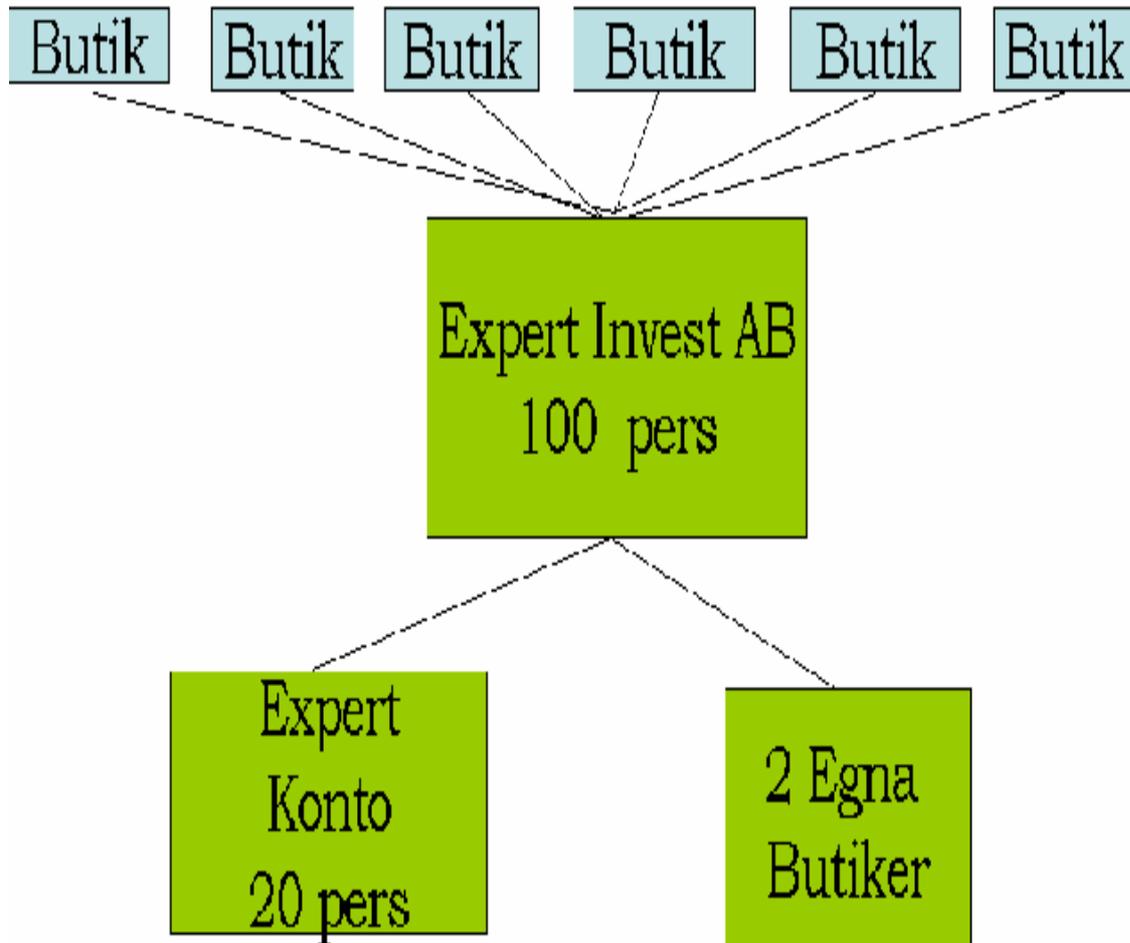
**Appendix 4: Expert central organization**
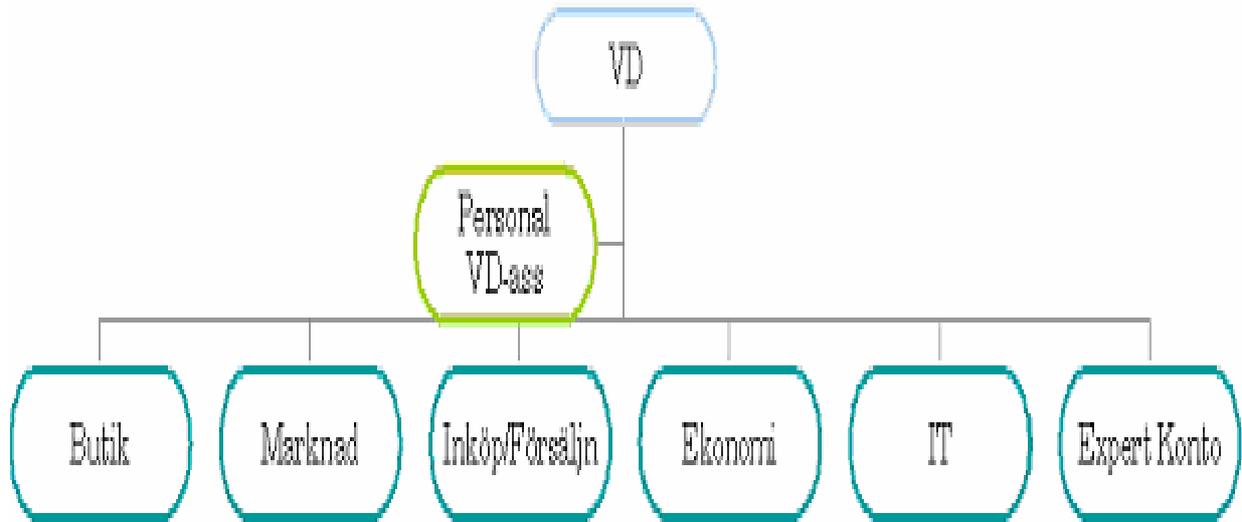
# Appendix 5: Expert system overview