Barriers to ERP system use

Overcoming a troublesome post-implementation phase

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Title: Barriers to ERP system use - Overcoming a troublesome post-implementation phase

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Abstract

As a way to broaden its offering Saab Support and Services started to implement a new ERP system in 2009. The main reasons were to be able to handle larger integrated solutions from its customers and achieve synergies between its many programmes; these benefits have only partially been achieved. ERP systems are a subject that has generated a lot of literature which describes how an implementation should be done and what benefits can be had, such as lowered costs, higher automation and better communication. This thesis has attempted to answer what barriers have been present at Saab in the post-implementation phase and what can be done in order to move past these and achieve unrealised benefits. Since there are gaps in the literature regarding the post-implementation phase an exploratory approach was used in this study with a case being studied at the Support and Services division at Saab. A literature study was performed in parallel with the collection of empirical data in order to let the collected data steer the direction of the research.

The three barriers to beneficial use that were identified were lack of vision for continuous improvements, lack of formal processes and lack of ease of use. Lack of vision for continuous improvement is a barrier since without it improvement measures will not be aligned and issues will persist. By communicating common goals and using benchmarks to follow up on those goals improvement can be made and employees can see the importance of the system. The second barrier is lack of formal processes which has caused bad transparency, creating issues with invoices and resulting in limited knowledge sharing between programmes. By standardising routines they are easier to benchmark it also becomes clearer what issues exist and how they relate to each other. With formalised processes it is easier to assign roles and it becomes easier to understand why data is entered since it is more apparent how it used later on in the process. The last identified barrier is the lack of ease of use of the ERP system. Since the software is difficult to use, training is generally needed in order to be able to use it correctly, but since limited training has been carried out employees still lack a greater understanding of how to adapt it into their workflow effectively. This barrier can be overcome either by further education and training users or by simplifying the interface and improving the usability. By having a well communicated vision, employees can work towards common goals, by standardising processes and simplifying the usability of the ERP system it is easier for new employees to learn, which means that employees can be shared easier within Saab.
Table of Contents

1 Introduction .................................................................................................................. 1

1.1 Saab .......................................................................................................................... 1

1.1.1 Support and Services .......................................................................................... 1

1.1.2 Air division .......................................................................................................... 2

1.2 The need for an ERP system .................................................................................... 2

1.3 Problem discussion ................................................................................................... 3

1.4 Purpose ....................................................................................................................... 4

1.5 Delimitations .............................................................................................................. 4

1.6 Thesis structure ......................................................................................................... 4

2 Frame of reference ...................................................................................................... 5

2.1 ERP systems ............................................................................................................. 5

2.1.1 Organisational benefits of Information Technology ........................................... 5

2.1.2 Drivers for ERP implementation ......................................................................... 7

2.1.3 Phases of ERP implementation ......................................................................... 7

2.1.4 Benefits of ERP systems .................................................................................... 8

2.1.5 Pitfalls of ERP systems ....................................................................................... 11

2.1.6 Implementation success factors ......................................................................... 11

2.1.7 Post implementation success ............................................................................ 12

2.1.8 ERP as an actor .................................................................................................. 14

2.2 Change management ............................................................................................... 15

2.2.1 Structuring change ............................................................................................. 16

2.2.2 Towards a learning organisation ........................................................................ 19

2.2.3 Successful change .............................................................................................. 20

2.2.4 Impact of culture ............................................................................................... 20

2.2.5 Knowledge management .................................................................................... 22

2.3 Control mechanisms ............................................................................................... 23

2.3.1 Organisation ........................................................................................................ 23

2.3.2 Management coordination mechanisms ........................................................... 25

2.3.3 Management control system as a package ......................................................... 27

2.3.4 Performance management system framework ..................................................... 28

2.3.5 Processes ............................................................................................................. 32

2.3.6 Resource and flow efficiency ............................................................................. 34

2.4 Model of analysis ..................................................................................................... 36
5.7.3 Lack of ease of use........................................................................................................64
6  Conclusions ..................................................................................................................................65
   6.1 Lack of vision for continuous improvement .................................................................65
   6.2 Lack of formal processes .................................................................................................66
   6.3 Lack of ease of use............................................................................................................67
7  Discussion .................................................................................................................................69
8  Recommendations for Saab .................................................................................................70
9  Works Cited ..................................................................................................................................71
Appendix A – MPB Request for service process diagram ..................................................77
Appendix B – Interview guide .................................................................................................78
List of Figures

Figure 1. Saab AB organisation chart .................................................. 2
Figure 2. ERP definition ........................................................................ 5
Figure 3. Theoretical framework for ERP post implementation success .......... 13
Figure 4. Dimensions affecting user perception of information systems .......... 15
Figure 5. Lewin’s Model of Change .......................................................... 16
Figure 6. Balanced matrix organisation ................................................... 24
Figure 7. Mintzberg’s six basic parts of an organisation .............................. 25
Figure 8. The Performance management systems framework ....................... 29
Figure 9. The efficiency matrix ................................................................ 35
Figure 10. State diagram of current and sought after states .......................... 36
Figure 11. Division Air matrix structure .................................................... 42
Figure 12. IFS Sherpa interface ................................................................ 45

List of Tables

Table 1. Reasons for ERP implementation .................................................. 7
Table 2. ERP system benefits .................................................................... 10
Table 3. Causes of resistance to change ..................................................... 17
Table 4. Strategies to deal with resistance ................................................... 18
Table 5. Factors to improve knowledge sharing .......................................... 23
Table 6. Management control systems package ......................................... 27
Table 7. List of interview participants ....................................................... 38
Table 8. The roles in participatory observation .......................................... 39
Table 9. Correlation of Problems and barriers ........................................... 64
1 Introduction

Enterprise resource planning (ERP) solutions started to become popular in the 1990s, as computers started to gain a larger role in business it became important to manage all that information. ERP systems can bring great benefits to an organisation that adapts it, but only if they are implemented correctly and as many as 31 percent of ERP implementations can be seen as failures (Botta-Genouzal & Millet, 2006). There is a lot of literature written on how to have a successful implementation, but what happens after that? It is common for organisations to view ERP implementations as one-time projects which can result in failure (Davenport, et al., 2004), it is therefore important to know what issues can be expected so that a plan on how to deal with them can be constructed. A company that has recently implemented a companywide ERP solution is Saab and they are currently in the post implementation phase. They have had some problems with the usage and have not gotten the benefits that was first expected.

1.1 Saab

In order to better understand the problem at hand, it is necessary to provide some background information about the company that was the subject of this study. Saab group is a global company that offers solutions, products and services for military and civil security with more than 13 000 employees spread over 30 countries and customers in more than 100 countries. Its core markets are Europe, Australia and North America and it is divided in six business areas: Aeronautics, Dynamics, Electronic Defence Systems, Security and Defence Solutions, Support and Services, and Combitech that is an independent subsidiary as opposed to the other five. The organisation can be seen in Figure 1 where Combitech is to the side to show its independent status. (Saab group, 2013c)

Saab is a large organisation which performs a large variation of work. It has grown both organically and through acquisitions and acquired companies have been allowed to keep using their legacy software. Coupled with the fact different parts of Saab have different needs, this has resulted in that there are multiple different enterprise systems that have been used through the organisation. The situation has resulted in that different parts of Saab have different ways of working which have caused collaboration issues and extra cost, due to having to maintain multiple software packages. (Maintenance Manager, 2013a)

1.1.1 Support and Services

The business area Support and Services at Saab is responsible for supplying a range of services and solutions to its customers. They have a broad business portfolio and includes contracts ranging from integrated support solutions for air, land and sea; equipment maintenance and service, technical training, spare parts and logistics, and more. Some examples of projects carried out by Support and Services are support for Saab Gripen, the civilian Saab 340 and 2000 airplanes, military helicopters within the Swedish Armed Forces, modernisation of weather radar stations for SMHI and modifying existing aircrafts to fit advanced surveillance equipment. Support and Services consists of four divisions that is shown in Figure 1: Air, Land, Maintenance Repair & Overhaul (MRO), and Lifecycle logistics. (Saab group, 2012)
1.1.2 Air division

The Air division that was the focus of this study was formed in 2012 within Support and Services to gather all the aircraft services in one organisational unit. They provide aircraft maintenance, target towing used for target practice of fighter airplanes, support for the 75 airlines that operates the 400 civilian passenger airplanes Saab 340 and Saab 2000, and other aircraft related activities. (Maintenance Manager, 2013a)

Saab had previously managed the maintenance of helicopters for the Swedish Armed Forces but lost the contract after several years to a competitor when the contract time ran out and was not renewed. It came as a big surprise since they were not used to having to compete for contracts from the Swedish Armed Forces, it led to scepticism of helicopter maintenance within Saab and as a result the organisation was dismantled. A few years later in 2010 Saab once again decided to compete for support contracts of military helicopters but deemed it necessary to earn the market’s trust by first regaining their lost competences. This was accomplished by investing in the company Scandinavian AirAmbulance (SAA) to take over their technical personnel and operations and run their maintenance of the ambulance helicopters and airplanes. SAA provides air ambulance services to several hospitals in Sweden, Norway and Finland spread across several different cities (Scandinavian AirAmbulance, 2013). The strategy succeeded and as a result Saab got two contracts for helicopter maintenance starting in early 2012. Because of the previous dismantlement the organisation and routines had to be rebuilt from ground up which together with the new ERP system has caused some friction. (Head of Support and Services, 2013)

1.2 The need for an ERP system

The market for Saab Support and Services is shrinking and competition is getting more and more severe as more companies move in to take market shares. Competitors has moved towards the Nordic markets, where Saab used to be strong, and have taken Saab by surprise, forcing Saab into the unfamiliar situation of having to compete for contracts with other very capable competitors. To combat this, Saab have taken on the strategy to offer more integrated solutions with more responsibility...
that used to be handled by the customer. (Head of Support and Services, 2013) An example of this is the Swedish training jet airplane SK60 where Saab has taken over the whole fleet with all maintenance and necessary upgrades and the Swedish Air Force buys airplane availability in the form of flight hours. This strategy is also in line with the general trend of where many other markets are heading where non-essential processes are outsourced in order to reduce costs and focus on their core competences (Nordin & Kowalkowski, 2010; Davies, 2004). To facilitate this new strategy, Saab’s management found it needed better internal integration between its enterprise systems, they wanted a single ERP solution that could be used by all business areas within Saab and that was capable of handling more extensive contracts (Head of strategy, 2013). With that in mind Saab started to research what ERP solutions were available and decided to proceed with a solution from IFS. Some different IFS solutions were already in use at Saab but in 2009 the decision was made by management to implement IFS across the whole Saab group (IFS AB, 2013). The old systems had to integrate with each other which created complexity that could be lowered by using one integrated solution. Other planned benefits of using one system throughout Saab is that they should be able to adapt the same routines and business processes throughout the organisation and lower their administrative costs with up to 50 percent. It should also be easier to exchange information and to integrate new organisations into Saab. (Pedersen, 2012)

1.3 Problem discussion

The ERP system chosen by Saab, which is called Sherpa, was to be used for quotations, order management, warehouse management, invoicing and more replacing around 60 legacy applications (IFS AB, 2013). Almost two years after the introduction of Sherpa the usage is not on the level that was planned and the potential benefits of the ERP system has not fully materialised. There is not enough data for the program managers to get an overview to use for strategic decisions; invoices are sent from separate parts of the organisations which has resulted in double invoices for the same material. The users are unhappy with the system, complaining of the long time it takes to use and of the complex and non-user friendly interface.

In order to manage general business processes Saab has created a management system called Global Management System (GMS) that was developed in 2011 to standardise what work is done, how, and by whom. The reason for GMS was to create a Saab that worked in one way. The processes described are kept general in order to fit the wide variety of work within Saab, but the existing processes in GMS does not fit Support and Services which has led to limited use of GMS. The work has continued the same way as before with locally developed processes and work is being done to adapt Sherpa to these processes.

To become more competitive, Saab would like to get a better overview of how profitable their existing programmes are to enable them to create a better value proposition for their customers. Furthermore most programmes leads to extra sales on top of the existing contract that is currently difficult to follow up within Sherpa because of missing data. If this information would be available to Saab they would be able to present quotations which accurately reflect what they can deliver and therefore be more competitive than they are today, but it requires that the use of the new ERP system becomes more effective and beneficial in order to get the needed overview. Saab has recognised the need for improvement and the question is what causes the issues they have.
1.4 Purpose
After studying the situation at Support and Services the purpose for the study was formulated to guide the study to look at why the ERP system has seen limited use and how further value can be achieved from a more extended use.

The purpose is to identify barriers to a beneficial use of an ERP system in the post-implementation phase and to formulate mechanisms that overcome the barriers to achieve unrealised potential benefits.

1.5 Delimitations
The study takes the form of a case study which has some inherent limitations and the environment at Saab also comes with its own limitations. The study has therefore been subject to the following delimitations.

- The ERP system is already chosen and considered fixed.
- The barriers identified will be barriers that affect end users of the system from an operational point of view.
- The barriers are relevant for the studied organisation where work is divided into programmes

1.6 Thesis structure
The report consists of four major parts, the frame of reference, methodology, empirical data, and the final analysis and conclusions. The frame of reference presents the theoretical framework used for the analysis, it addresses IT- and ERP systems with the purpose of looking into what they are used for and what benefits can come from them. It deals with change management to see how big changes such as ERP implementations should be managed, as well as control mechanisms that look into how managers can control the organisation to get the wanted results from it. It also looks at what processes are and how an organisation can make more use of them.

The research method has been a case study with grounded approach based on interviews and participatory observation. The methodology chapter describes the research strategy, design of the study, data collection methods and analysis, and how the quality of research was ensured.

In the section with empirical data the collected data is presented based on interviews, documents and observations made by the authors. It describes what work is done at Support and Services, how the ERP system was implemented and how it is used, as well as the management structure.

The analysis and conclusions chapters combine the two previous chapters to find out what the barriers to ERP usage are and how they can be circumnavigated. It takes up some problematic issues that were identified during the study and analyses what barriers that causes them.
2 Frame of reference

To answer the purpose the frame of reference has been chosen to include subjects of ERP systems, change management, management control as well as processes. In order to identify barriers it is important to understand what an ERP system is capable of and how a successful implementation could be done. Since ERP system implementations are large projects and involves people having to change how they perform the work, it is relevant to look at how change can be carried out and what factors are important to focus on, such as dealing with resistance. The frame of reference then covers what strategies management can use to manage change, how they follow up on that change, and what mechanisms can be used to control the organisation in the desired direction. It concludes by covering benefits of having processes and what can be done if an organisation wants to become more process oriented.

2.1 ERP systems

An enterprise resource planning system, or ERP for short, is an enterprise system software built on multiple integrated modules. Botta-Genoulaz & Millet (2006, p. 203) defines an ERP system as “an integrated software package composed by a set of standard modules (Production, Sales, Human Resources, Financial, etc.), developed or integrated by the vendor, which can be adapted to the specific needs of each customer”. Figure 2 is a representation of how an ERP might integrate different modules into a single system.

![Figure 2. ERP definition (Botta-Genouzal & Millet, 2006, p. 203)](image)

2.1.1 Organisational benefits of Information Technology

While ERP systems are a special type of information technology (IT) systems, organisations can still receive benefits from using IT throughout their organisations. Since information technology first entered into the business world in the 1950s it has been closely tied to how work is carried out, in some cases it can be said to have radically altered work. IT and its potential for changing processes has been acknowledged since early on but there is often multi decade lag between the implementation and the point where the technology leads to significant changes in an organisation’s processes. (Davenport, 1993)
According to Hammer & Champy (1993, p. 91) information technology has such a disruptive power that it can “break the rules that limit how we conduct our work” and therefore “[...] makes it critical to companies looking for competitive advantage”. On the other hand, Carr (2003) agrees that while IT system can create competitive advantage he believes that it is not sustainable, experiments can be costly and even if successful the good ideas will quickly be copied by competitors. In contrast, ignoring IT is not a viable alternative since the infrastructure is often needed, companies should therefore use tried and stable solutions that suits the organisation’s needs (Westelius, 2009). Hammer & Champy (1993, pp. 92-99) describes some of the organisational benefits that IT-systems can bring:

*Information can appear simultaneously in as many places as needed* - When information is captured on paper only one person can access it at a time. Even if copies are made, they will become outdated as soon as the original document is updated which can result in conflicting data. Database technology allows multiple people to have access to information simultaneously and when the source is updated it is visible to all people and can therefore eliminate duplication of work and confusion.

*A generalist can do the work of an expert* - In the 80s it was believed that complex IT-system could be used to replace company expert which has been shown not to be true, the experts are still needed in order to continue to learn and advance the company - What these systems have shown to be useful for is to aid relatively unskilled workers to perform tasks that used to require expertise knowledge. These systems help eliminate handoffs, delays and errors which leads to benefits in cycle-time, accuracy and cost.

*Businesses can simultaneously reap the benefits of centralisation and decentralisation* - By using old technologies such as postal and courier services to manage decentralized information, management must sacrifice flexibility since the information flow is slow. New technology eliminates this trade-off between inflexible centralized decisions and flexible decentralized decisions by allowing high bandwidth communications between headquarters and field offices. IT can also eliminate the need for separate field units with their own overheads since it can now be managed centrally.

*Decision making is part of everyone’s job* - A notion that is preserved from the industrial revolutions is that managers were able to make superior decisions since they had access to more information. Hierarchal decision making is associated with high costs since it is time consuming which can cause production to temporarily stop. Modern database technology allows information previously only available to managers to be more widely accessible allowing front line workers, when properly trained, to have sophisticated decision making possibilities. Decisions can be made faster resulting in problems being resolved quicker.

*Field personnel can send and receive information wherever they are* - With the evolution of portable computers and wireless data personnel can access and contribute data out in the field which allows for more flexible work flows and more timely information updates.

*Things tell you where they are* - A company can know in real time where its trucks are. This can be reported automatically with on-board systems which require no manual input. This type of access to real-time data means that redundancies in personnel and equipment can be reduced.

*Plans get revised instantaneously* - Information doesn’t have to be distributed manually. This means that schedules can be adjusted to match real-time, not historic, needs.
While IT in general can bring benefits, ERP solutions can bring additional benefits due to the larger and integrated scope of the systems.

2.1.2 Drivers for ERP implementation
There are multiple reasons to why an organisation would want to implement an ERP solution, this section will go over the most common drivers for comparison with the situation at Saab. Spathis & Constantinides (2003) has compiled a list of drivers from literature and ranked them based on an empirical study. The three biggest reasons stated for implementing an ERP system is an increased demand for real-time data (44 out of 45 companies stated this was a main driver), demand for information generation for better decision making (91 percent) and integration of applications (84 percent). More reasons can be seen in Table 1. Hallikainen et al. (2004) identifies in their study that 44 percent of the surveyed companies mentions data visibility and integration for managerial aid as a reason to implement their ERP systems, making it the most common reason in their study. The second most common reason was the desire to adopt best practice business models and ways of doing business with 24 percent (Hallikainen, et al., 2004). Although the specific percentages will differ between studies, it is clear that increased usage of data as a decision tool is a top ranking driver for ERP implementations among companies.

Table 1. Reasons for ERP implementation (Spathis & Constantinides, 2003)

<table>
<thead>
<tr>
<th>Reasons for ERP implementation</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased demand for real-time data</td>
<td>98%</td>
</tr>
<tr>
<td>Information generation for decision making</td>
<td>91%</td>
</tr>
<tr>
<td>Integration of applications</td>
<td>84%</td>
</tr>
<tr>
<td>Implementation as a step to re-engineer business processes</td>
<td>49%</td>
</tr>
<tr>
<td>Reduce costs</td>
<td>49%</td>
</tr>
<tr>
<td>Increase sales</td>
<td>36%</td>
</tr>
<tr>
<td>New business plan</td>
<td>20%</td>
</tr>
<tr>
<td>Competition</td>
<td>18%</td>
</tr>
<tr>
<td>Development of activities into new areas with business contacts</td>
<td>16%</td>
</tr>
<tr>
<td>Integration of information systems</td>
<td>9%</td>
</tr>
<tr>
<td>Stock exchange requirements</td>
<td>7%</td>
</tr>
</tbody>
</table>

Davenport (1998, cited in Botta-Genouzal & Millet, 2006, p. 204), believes that there are a few reasons why a company would want to implement an ERP solution including: using a single source of data, a potential cost reduction and the potential gain in business integration. Botta-Genoulaz & Millet (2006, p. 205) agrees and adds a few other drivers such as that the information quality can be increased, that inventory can be reduced and that both logistics & order management and cash flow & forecasts can see improvements.

2.1.3 Phases of ERP implementation
Implementing an ERP solution is a big project and it is not done overnight, it is therefore interesting to see how it can be done and what is important to be aware of during the different implementation phases. It is possible for issues in earlier phases to lead to problems later on and in order to understand problems it is beneficial to understand how they evolved in order to be able to solve them. An organisation’s experience with an ERP system moves through several phases, these phases are characterized by key players and activities and even though each organisation’s experience is unique it usually follow these phases (Markus & Tanis, 2000, pp. 190-195):
Project chartering phase - The chartering phase is the phase leading up to the funding of the project and it is where the need for an ERP system is identified by management. Key activities include selecting a software package, identifying project manager, approving a budget and schedule. Key players in this phase are vendors, consultants, company executives and IT specialists.

The project phase - During this phase an ERP system has been chosen and work begins implement it, the system is then configured and rolled out to the organisation. Key activities include software configuration, system integration, testing, data conversion, training and rollout. Key players include project manager, project team members, internal IT specialists, the vendor and consultants.

Shakedown phase - The shakedown phase is when the company makes the transition to normal operations (Markus, et al., 2000). Activities during this phase include bug fixing, system performance tuning, retraining and staffing to handle temporary inefficiencies. It is according to Markus & Tanis (2000) during this phase errors of previous phases are felt, examples of such issues are personnel adopting workarounds to cope with early problems, workarounds that will still be used even after the issues are resolved. Further it is common that organisations rely too heavily on knowledgeable team members rather than building relevant knowledge and skills in all relevant personnel. The phase can be said to end when “normal operations” are achieved or alternatively the project is ended and deemed a failure. (Markus & Tanis, 2000)

Onward and upward phase - The onward and upward phase continues until the system is replaced or upgraded. It is during this phase that the company can “captures the majority of business benefits (if any) from the ERP system” (Markus, et al., 2000, p. 246). Key players during this phase include operational managers, end users and internal and external IT support personnel. A common problem of this phase is the loss of knowledgeable personnel. (Markus & Tanis, 2000)

2.1.4 Benefits of ERP systems
ERP systems, much like other IT-systems, evolved out of the need to handle an ever increasing competitive environment (Spathis & Constantinides, 2003), however what drives an organisation to implement an ERP solution doesn’t always match what benefits they achieve in the end. Looking at what benefits can be achieved and understanding why an organisation has not achieved them can help to create an understanding of what issues exist, and why they exist. Many authors have brought forward benefits for implementing and using ERP systems, the framework used in this study was created by Shang & Seddon (2000) based on 233 cases; the framework proposes five different dimensions as to how these benefits can be classified.

Operational benefits
Cost reduction - ERP systems can increase the level of automation and thus remove redundant processes which can lead to a reduction in costs.

Cycle time reduction - Customer support, employee support and supplier support can experience measurable cycle time reductions.

Productivity improvement - Metrics such as products produced per employee or customer served by employee can see improvements.

Quality improvement - Reductions in error rates and duplication errors can be seen. Rates in accuracy and reliability can also be improved.
Customer service improvement – An ERP system can make it easier to deal with customer inquiries due to the amount of customer data available in the system.

Managerial benefits
Better resource management - The ERP system can lead to improved inventory management which results in reduced stock and increased turnover partly due to improvements with the supply chain. It can also lead to better management of the workforce with improved allocation and utilisation of employees based on skills and experiences.

Better decision making – Due to the integrated nature of an ERP system it has the ability to generate improved operative data which means that the data can be used to make better informed decisions about market responses and strategic planning.

Better performance control - Financial performance can be measured and controlled in new ways, either by business, product, customer or geography or a combination of them. The organisation can experience an overall increase in operational management efficiency and effectiveness.

Strategic benefits
Support business alliances - Newly acquired businesses can efficiently and effectively be consolidated into an organisation’s standard business practices.

Build cost leadership - ERP makes it easier to achieve economies of scale by streamlining processes and shared services.

Build external linkage - Suppliers, distributors and business partners can be integrated into the system.

Enable worldwide expansion - An ERP system allows for a centralized world operation that can handle global resource management, multi-currency capabilities, global market penetration and the ability to roll out solutions globally quickly and cost effectively.

Infrastructure benefits
Increased business flexibility - An ERP system can enable an organisation to respond quicker, at a lower cost and provide a range of options to internal or external changes.

IT cost reductions - An organisation’s legacy systems require maintenance and integration which is costly. An ERP system can consolidate these systems which can lower costs.

Increased IT infrastructure capability: stable and flexible for the current and future business changes - ERP systems are stable; they are built on streamlined and standardized platforms. They are seeing continuous improvements and have global support. They bring flexibility with them since they are built on modern technologies, they are extendable to other parties and expandable to a range of applications and they are customizable and configurable.

Organisational benefits
Facilitate business learning and broaden employee skills - ERP systems can bring the ability to shorten learning times and broaden the employee’s skills.
Empowerment - ERP systems can be used to track accountability and give employees more value added responsibilities. It also makes it possible to work autonomously.

Change culture with common vision - Communication between employees can be handled better, which enables the coordination and harmonisation of differences and interdepartmental processes. It also enables the vision to be consistent across different levels of the organisation.

Change employee behaviour with shifted focus - ERP systems enables employees to put more concentration on core work.

Better employee morale and satisfaction - By having a system that enables better decision tools employee satisfaction can increase. It will also enable employees to work and solve problems more efficiently which will also increase employee morale.

From the same study as mentioned in Drivers for ERP implementation, Spathis & Constantinides (2003) listed the benefits achieved from ERP systems. Each benefit was ranked on a scale of 1 to 7 where a 1 means that no benefit was had and a 7 was a perfect benefit. The full table can be seen in Table 2.

<table>
<thead>
<tr>
<th>ERP system benefits</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased flexibility in information generation</td>
<td>5,60</td>
</tr>
<tr>
<td>Improved quality of reports</td>
<td>5,33</td>
</tr>
<tr>
<td>Increased integration of applications</td>
<td>5,31</td>
</tr>
<tr>
<td>Easier maintenance of databases</td>
<td>5,16</td>
</tr>
<tr>
<td>Increased user friendliness of information systems</td>
<td>4,89</td>
</tr>
<tr>
<td>Reduction of time for issuing reports and statements</td>
<td>4,87</td>
</tr>
<tr>
<td>Improved decision making process</td>
<td>4,87</td>
</tr>
<tr>
<td>Improved co-ordination between departments</td>
<td>4,64</td>
</tr>
<tr>
<td>Reduction in errors in logistics</td>
<td>4,51</td>
</tr>
<tr>
<td>Increased internal communication</td>
<td>4,49</td>
</tr>
<tr>
<td>Reduction of time for transaction processing</td>
<td>4,40</td>
</tr>
<tr>
<td>Improved delivery times</td>
<td>4,27</td>
</tr>
<tr>
<td>Reduction in stock levels</td>
<td>3,91</td>
</tr>
<tr>
<td>Increase in stock turnover</td>
<td>3,78</td>
</tr>
<tr>
<td>Reduction of total operating and administrative costs</td>
<td>3,67</td>
</tr>
</tbody>
</table>

The most common drivers for implementing ERP systems according to Spathis and Constantinides (2003) are increased demand for real-time data, information generation and integration of applications. These drivers can be linked to benefits that have been achieved by organisations that have implemented ERP systems. Integration of applications is a high-ranking benefit as can be seen in Table 2. Shang and Seddon (2000) also brings up integration as a reason for several of the benefits in their framework (such as better decision making, build external linkages and IT cost reductions). Increased demand for real-time data and information generation for decisions can be connected to the benefits increased flexibility in information generation and improved quality of reports which are the benefits that are highest rated in Table 2, improved decision making process rated at 4,87 is also a commonly achieved benefit that can be connected to those drivers. Shang and Shedons (2000) framework also covers these benefits as better decision making under managerial benefits. Reduced
costs which is a driver for 49% of implementations (Spathis & Constantinides, 2003) is the lowest rated benefit with a mean of 3.67. This could be due to the reason that a reduction in costs can be hard to measure and it is therefore not necessarily surprising that it is one of the lowest rated benefits. Spathis and Constantinides (2003) believe that some of the benefits might be lower rated because of the infancy of the systems and some benefits are realised over a longer-term which can also explain that reduced costs is so low rated. Some benefits that are highly ranked, such as *reduction in errors in logistics* and *increased user friendliness of information systems* have no clear connection to the drivers, which shows that even unplanned benefits can be achieved from implementing an ERP system. Some of the drivers, such as *competition, new business plan* and *re-engineering processes* have no direct analogue benefits and it is therefore difficult to say how often they are realised. While Shang and Seddon (2000) lists benefits that can be achieved in their framework, Spathis and Constantinides (2003) have actually rated them and shown how often they are achieved which gives greater context.

2.1.5 Pitfalls of ERP systems
While great benefits can be attained as many as 31 percent of ERP implementations are deemed a non-success. The main causes that Botta-Genou laz & Millet (2006, p. 205) identify is that these problems are related to people, such as changing work practices. They further say that it is a common misconception that ERP is a computer subject, when in reality it is a people related, business subject (Botta-Genouzal & Millet, 2006). According to Spathis & Constantinides (2003) the problems that arise from ERP implementations can be classified into one of three categories: technical, financial or organisational. In order to achieve a smooth implementation a close co-operation both within the organisation and between the organisation and the vendor is essential. According to Yusuf et al. (2004, p. 253): “Some of the companies that implement ERP systems do not realise the full benefits that the system offers because most organisations are not organised in the correct fashion to achieve the benefits”.

2.1.6 Implementation success factors
By looking at how an implementation should be carried out and compare it to how the implementation has been carried out it is possible to understand why issues and problems have occurred. Deeming an ERP implementation a success is very dependent on who you ask and when the evaluation is done, it can depend on expectations on the project and what was promised from the start (Scott & Wagner, 2003). For an ERP implementation to be successful “every one should understand that changes are going to have to be made, not for the good of the system itself, but for improved organisational performance and a better fit between the information system and the rest of the organisation” (Davenport, 2000, p. 44). Many organisations approach ERP systems as a one-time project, the roles of the executives is then to bring together and oversee the resources needed, but that is not the case. According to Davenport there are a few strategies that organisations can adopt in order to shorten the time it takes before the business values are realized. (Davenport, et al., 2004)

*Invest the effort required to get a critical mass of implementation* - In order to achieve better integrations and seamless information flows between functions, business units and geographies, it is necessary to implement the ERP system throughout the organisation.
Manage Enterprise Systems as an on-going program - Independent on how much work has been put into the ERP system historically, getting value from the system requires ongoing management and attention.

Prioritize benefits and create an action plan to achieve them - Some organisations seek benefits that might require different actions than those used to achieve general, long-value goals. It is then important to prioritize in order to achieve what is most important to them.

Manage and measure benefits - By measuring benefits and holding people accountable for them will significantly shorten the time it takes to achieve value.

Many ERP solutions have best practices built in; if this is the case it is important that those fit well with the organisation. As illustrated in an example by Light (2005, p. 121) “For example, in one company I have worked with, the so-called best practices inscribed in a CRM product, although more efficient than the existing processes, would have depersonalized their touted unique selling point of personal customer contact had they been implemented”. Even so, companies that want to use an ERP system have to change their work practices to fit the software (Yusuf, et al., 2004, p. 254) which could be a time consuming and complex job. This point is strengthened by Bingia et al (1999, p. 9) who say that “implementing any integrated ERP solution is not as much a technological exercise but an organizational revolution”.

One of the greater benefits an ERP system brings is, as noted above, improved co-ordination between departments but organisations needs to understand that integrating departments through the system will affect the entire business. As information starts to flow faster mistakes gets magnified as they flow through the value chain, it is therefore important to have a way to deal with them (Bingia, et al., 1999, p. 11). As noted by Light (2005, p. 119): “Also, although the adoption of packaged software may help relieve existing problems, it may also introduce new ones”.

2.1.7 Post implementation success
During the different phases of the ERP lifecycle different factors affect it in different ways, it is therefore important to understand what can be done in the different phases of an implementation and also how something in one phase can affect later phases. Since Saab is currently in the post implementation phase it is important to know what can be done to move past the issues and barriers that have been identified. Kiriwendeniya et al (2013) has through a study with a qualitative approach based on multiple case studies identified eight factors that are important in order to achieve a successful post-implementation of an ERP system. The post implementation phase consists of the shakedown phase and onward and upward phase. In the study success is defined as a system that has achieved expected business results, is implemented in under 18 months and has achieved satisfaction among management and users. The factors and how they relate to each other is illustrated in Figure 3.
Extent of customisation of the ERP system – Customisation is often done do provide more system functionality and can be done as enhancements and modifications. Kiriwandreya et al. (2013) show that a high degree of customisation has a negative impact on the implementation success while a low amount of customisation that only includes customising the graphical interface and output can have a positive effect.

Post-implementation training - Training allows users of the system to quickly become familiar with the system and a higher degree of effective training lead to a higher success rate.

Top management support or influence - Top management support affects every stage of the ERP implementation lifecycle, support from management manifests itself as providing financial support, providing support for change management and training. Top management support has a positive relationship with post implementation success.

Post implementation benchmarking - Just setting benchmarks is not enough. The benchmarks have to match the business requirements, it is also important to set benchmarks for users. The results have to be used so that action can be taken from the information learned.

Change management - Change management is important throughout the implementation process and continues to be important in the post implementation process.

Maintenance of ERP - ERP maintenance refers to the process of keeping the ERP system up to date in order to meet the changing requirements of its users.

Introduction of additional features - Adding value adding features such as enhancements to the user interface and templates leads to a higher user satisfaction which is vital to realize the benefits through effective system use.

Successful pre implementation activities - Pre implementation activities such as adequate investments, infrastructure, initial change management and crisis management directly impact the post implementation success.
2.1.8 ERP as an actor
To explain the usage of ERP system they can be seen as actors in the context of actor-network theory that is a research methodology that focuses on the associations between actors, without imposing pre-determined structure. Actors are seen as both humans and non-humans who have the ability to influence situations. (Pollack, et al., 2013) The way ERP systems are used differs, it can depend on why or how it was implemented. By choosing to look at an ERP system as an actor Askenäs & Westelius has identified five different roles that an ERP system can take on within an organisation: (Askenäs & Westelius, 2003)

Bureaucrat - The bureaucrat is when the ERP system enforces a structure, a certain way of working, that is accepted by its users. It makes certain that the laid out structure adheres to the existing rules.

Manipulator - Much like the bureaucrat the manipulator enforces a certain way of working, but it is not the way people are used to working. The ERP system may be given the role as manipulator if it is allowed to change or conserve work processes in ways not intended by its users.

Consultant - A consultant is someone contracted to perform specific, nontrivial tasks, and to advise. An ERP system acting as a consultant provides the user with options and with solutions tailored to the situation. For the system to take the consultant role the user has to be in control and be able to understand the advice provided.

Administrative assistant - An ERP system given the role of an administrative assistant is not used in the same extent as the three above mentioned roles. The administrative assistant does not affect or influence the processes and structures of the organisation in any fundamental way. The users’ role is more active and the system is only put to limited use.

Dismissed - This is when the ERP system is not used, it can be temporary or permanent. An ERP system that is dismissed becomes redundant which can be caused by many different reasons. This role is not one that is sought after.

Westelius & Askenäs (2003) has chosen to place these roles on two dimensions, Information System (IS) fit with structure and Direction of control, as can be seen in Figure 4.
IS fit with structure refers to whether or not the intended use of the information system matches the organisations structure and business logic. Direction of control is if the information system directs the users on how to use it, or it supports them in how they are used to working. The role dismissed does not match any of the quadrants and it has therefore been left out.

While ERP systems can bring great benefits many implementations fail, this is generally because of people and difficulties of changing their work practices. ERP and their implementations is a business related subject dealing with people rather than computers. (Botta-Genouzal & Millet, 2006)

2.2 Change management
The implementation of a new ERP system is a big change for most organisations. Employees have to change how they work and there can be a lot of resistance if the change is not well grounded throughout the organisation. It is therefore important to understand why change is needed, what can be done to manage it and what to do if there is resistance. Change is brought on by many different reasons, these reasons can be either internal or external. Examples of external forces for change are economic and political, cultural and social, demographical, industrial or technological. Internal forces for change can be low performance of the firm, new leadership, low satisfaction, new mission or conflicts. Although change often is vital for an organisations survival, constant change that is not allowed to settle is likely to be ineffective. (Nahavandi, 2009)

Organisational culture has a significant effect on change and must be taken into consideration, not all employees react the same way towards change. Change is often stressful and can easily be met with resistance, sudden or drastic change is more likely cause stress and therefore causes more resistance. Some types of change can be foreseen and therefore carefully planned and rolled out slowly but that is not always the case, there are five different types of change. (Nahavandi, 2009)

Planned – This type of change occurs when an organisation makes a conscious decision to change in response to a specific problem or pressure.
Unplanned – This type of change happens randomly and suddenly without a planned reason.
Evolutionary – Evolutionary change happens continuously in smaller increments.
Convergent – This consists of planned evolutionary changes that are the result of conscious decisions to change the organisation.

Revolutionary or frame-breaking – A dramatic change that happens rapidly.

The different types of change require different types of actions from leader within the organisations. When dealing with planned evolutionary change a leader’s ability to structure tasks may become important, when facing unplanned changes on the other hand a charismatic leadership may be more central. (Nahavandi, 2009)

2.2.1 Structuring change
In the Force Field theory proposed by Lewin (1951) he states that organisations contain forces that both drive change and at the same time resist them. If these two forces remain equal the organisation will remain in a status quo. In order to overcome inertia and implement change leaders must then either strengthen the forces that are for change or work to minimize those against change. Lewin’s further suggested a model of change which can be seen in Figure 5. (Nahavandi, 2009)

![Diagram](image.png)

**Figure 5. Lewin’s Model of Change (Lewin, 1951)**

In the first step, Unfreezing, it is important to get employees to start to question the existing practices and behaviours so that a motivation towards change starts to develop. Unfreezing happens easier if there are strong forces towards change, either internal or external. An important step for leaders to help out is to communicate the need for change. (Nahavandi, 2009)

In the second step, Changing, is where the actual changes are made, new practices and policies are implemented and new skills and behaviours are learned. In this step the leader’s role continues to be important by supporting followers, emphasising the need for change and correcting the course as needed. Most organisations only focus on this step, forgetting about the unfreezing and refreezing stages which cause problems. (Nahavandi, 2009)

In the last step, Refreezing, the changes have to be encouraged and supported for them to become part of employee’s routines. The long-term success of change efforts depends on how well the changes become part of the organisations culture. The leaders’ role in this stage is coaching, training and using appropriate reward systems to encourage employees and help solidify the changes that
have been implemented. According to John Kotter (cited in Brazil, 2007) it is important for leaders to celebrate early success and short-term progress to keep employees motivated. (Nahavandi, 2009)

In Lewin’s model for change there are four key characteristics that leaders must take in consideration and deal with for effective change management, these are (Nahavandi, 2009):

- They have to recognize the need for change and prepare and motivate employees to implement it.
- They have to be aware that there will be resistance to change.
- The employees are the source for learning and change.
- New behaviours need to be supported and allowed time to evolve and take hold.

Change can either be driven from a top-down approach where top management initiates and pushes for change or a bottom-up approach where change is driven by individuals or groups throughout the organisation. A top-down is usually done by traditional, hierarchical organisations and can force change rapidly, but it is met with more resistance. Bottom-up approach on the other hand involves employees driving the change and will therefore garner less resistance, a risk with this approach is that top management will not get involved which is something that is essential to success. (Nahavandi, 2009)

**Dealing with resistance**

Change is a big source of stress in people’s lives and it is therefore often met with resistance, even if change is grounded in the organisation, resistance will occur and it is therefore important to know how to deal with it. Although smaller changes can be accepted after a period of time, larger-scale changes require long periods of adaptation and encouragement and support. There are three main causes that can explain resistance: organisational, group and individual factors. (Nahavandi, 2009) Nahavandi (2009) has compiled a list of the different causes of resistance which is illustrated in Table 3.

<table>
<thead>
<tr>
<th>Organisational causes</th>
<th>Group causes</th>
<th>Individual causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inertia</td>
<td>Group norms</td>
<td>Fear of the unknown</td>
</tr>
<tr>
<td>Culture</td>
<td>Group coherence</td>
<td>Fear of failure</td>
</tr>
<tr>
<td>Structure</td>
<td></td>
<td>Job security</td>
</tr>
<tr>
<td>Lack of rewards</td>
<td></td>
<td>Individual characteristics</td>
</tr>
<tr>
<td>Poor timing</td>
<td></td>
<td>Previous experiences</td>
</tr>
</tbody>
</table>

In order to deal with these different causes there are a few approaches that leaders can use depending on the individual situation. Table 4 consists of a list of strategies that can be used to deal with resistance, advantages and disadvantages to them and when to use them during the change process. (Kotter & Schlesinger, 1979)
<table>
<thead>
<tr>
<th>What to do</th>
<th>When</th>
<th>During phase</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education and communication</strong></td>
<td>When there is a lot of fear of the un-</td>
<td>Is effective through all phases of</td>
<td>By changing people's minds by providing facts they will be less likely to</td>
<td>Can be time-consuming for larger projects when a large number of people are</td>
</tr>
<tr>
<td></td>
<td>known and information is scarce.</td>
<td>the change process.</td>
<td>resist.</td>
<td>involved.</td>
</tr>
<tr>
<td><strong>Participation and involvement</strong></td>
<td>When people lack information or have the</td>
<td>Is effective through all phases of</td>
<td>Can lead to greater commitment and better ideas.</td>
<td>Can be time-consuming, risk of inappropriate change being implemented.</td>
</tr>
<tr>
<td></td>
<td>ability to obstruct change.</td>
<td>the change process.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Facilitation and support</strong></td>
<td>It should be used when employees are</td>
<td>Is most relevant during the refreeze</td>
<td>It is the only way to deal with resistance who is caused by adjustment</td>
<td>Can be time-consuming and there is a risk that it might still fail.</td>
</tr>
<tr>
<td></td>
<td>resisting due to fears that they won’t be</td>
<td>period.</td>
<td>problems.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>able to make the appropriate adjustments.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Negotiation and agreements</strong></td>
<td>When people have considerable power to</td>
<td>Is most relevant during the change</td>
<td>Is relatively easy and a powerful way to defuse major resistance.</td>
<td>Can be expensive and lead to mistrust and resentment.</td>
</tr>
<tr>
<td></td>
<td>resist the change.</td>
<td>and re-freeze period.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Manipulation and co-optation</strong></td>
<td>This can be used when other tactics are</td>
<td>During change phase.</td>
<td>Can be a relatively quick and inexpensive solution.</td>
<td>If people become aware that they are being manipulated it can lead to</td>
</tr>
<tr>
<td></td>
<td>either not working or are too expensive.</td>
<td></td>
<td></td>
<td>problems due to mistrust and resentment.</td>
</tr>
<tr>
<td><strong>Explicit or implicit coercion</strong></td>
<td>When there is no time, nothing else</td>
<td>Is most relevant during the change</td>
<td>It can be fast and could overcome most kinds of resistance.</td>
<td>Only effective in the short run and can leave people mad at the initiator.</td>
</tr>
<tr>
<td></td>
<td>works and the people resisting have</td>
<td>and re-freeze period.</td>
<td></td>
<td>Can cause morale problems.</td>
</tr>
<tr>
<td></td>
<td>considerable power.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

By providing education and training through many different channels resistance can be reduced. Information can be spread through either face-to-face communication, newsletters, training sessions or announcements. By communicating the ideas behind the change people will be able to understand the underlying need for it and therefore resistance will be reduced. Letting people that are resisting the change be involved by participating in the change and by letting them give input is one of the most effective strategies for building commitment towards change since it is a natural way of spreading information and the change is not forced upon them. Facilitation and support can be done by providing training of new skills or by giving employees time off after a demanding time period, or simply listening. It is important to be active and constantly listen in order to deal with resistance. Negotiation and agreements could take form as a written agreement between managers of different
divisions; that way the agreement can be pointed to if there are complaints. Powerful parties can try to block the change, one way of dealing with that is to offer incentives to active or potential resisters in exchange for acceptance of the change. Giving employees other tasks so that their attention cannot be put to resisting the change is a way of manipulation and co-optation. Another way would be to put one of the key people from a resisting group in a key position in one of the change teams, but unlike participation, here the person is not brought in for his or her ideas, but simply to gain their endorsement. As a last resort coercion can be used either explicit or implicit, sometimes employees have to be either explicitly or implicitly threatened in order to subdue resistance, for example by saying that they will lose their jobs, promotions and so forth if they don’t comply. (Nahavandi, 2009)

2.2.2 Towards a learning organisation

Organisations can take it one step further and organise themselves so that they are built to change, this is something that has to be a part of the corporate culture. If an organisation can create a culture of continuous change the change can happen in smaller increments and will therefore be easier to handle. Senge (2006 cited in Nahavandi, 2009) suggested the importance of flexibility, the ability to learn and adapt and change continuously as parts of the learning organisation. A learning organisation can be defined as an organisation where the culture of the employees is to constantly seek to expand and push the boundaries, where their capacity to create is ever evolving, innovation and cooperation is cherished and knowledge is seamlessly transferred throughout the organisation. A learning organisations in not just an organisation that knows how to handle change but its goals is to be a place where creativity, flexibility and learning are a part of its culture and everyone’s processes. There are a few core elements that are important in order to become a learning organisation, these are (Senge, 2006 cited in Nahavandi, 2009, p. 315):

*Shared vision* – It is important to have a shared vision that employees can relate to and understand because it gives them a common goal to work towards which builds commitment.

*System thinking* - It is important that both the leader and followers understand how the organisation functions. By being aware of the inner workings such as inter-relations, visible and invisible bonds that connect people or functions it helps to create an understanding of how changes can affect it all.

*Mental models* – Mental models can be seen as the assumptions held by employees, by being aware of how these stated and unstated rules and models guide behaviours and decisions new ones can be created through open cooperation.

*Personal mastery* – It means that people in the organisation are committed to learning. Knowledge can be acquired through either training or interaction with co-workers.

*Team learning* – By breaking down boundaries that are present in most organisations synergies can be gained. Team learning works by individuals engaging in dialogue and discussion which can be done by encouraging open communication.

There are also a few factors that prevent organisations from becoming a learning organisation, these can be called *blocks to learning* and these blocks are as follows (Nahavandi, 2009).

*Isolated jobs* – It stems from the problem that tasks, jobs and goals are viewed as separate and isolated things, employees lack system thinking.
Ignoring gradual change – When larger scale change projects are done it is easy to ignore the more gradual and incremental changes that occur that would possibly result in the same outcome.

Emphasis on events – By building on the previous point above leaders might give too much focus specific events or causes of problems without giving much thought on the context and it also distracts from the long term goals.

Blaming others – It is easy to put blame on others for problems that occurs but that fosters resentment and does not help when trying to build one open organisation.

Skilled incompetence – If organisations rely on expert people to solve problems it can become difficult when they do not have the competence to solve it, it can be hard for them to admit that they do not have the abilities needed. If a manager is in this position the problem becomes even more difficult to handle.

2.2.3 Successful change
Change has become the norm in many of today’s organisations according to Nahavandi (2009) and there are internal and external pressures on the organisation to be flexible, there are a few things that a manager can do to help when implementing change. Since change management and top management support are important parts of a successful post implementation ERP implementation according to Kiriwandeniya, et al. (2013) they are important areas to cover in order to know what has been done and what can be done in the future. Firstly, the biggest one is communication, by constantly communicating why the change is needed and by making employees understand the need for it resistance will be reduced. This also applies for top management, it is important to keep them informed so that they stay involved during the process. Secondly it is important to identify so called change agents, all organisations have formal leaders but there are also informal, opinion leaders who are respected. By winning them over and gaining their support they can help during the change process and make it move along much faster. Thirdly it is important to involve the people who will be affected by the change. It is not always possible to affect the actual change but by involving more people in the process resistance will hopefully be kept to a minimum. Fourthly, during the change process, people need help, it is important to be supportive to employees in need by offering training, help or simply support. It is also important to celebrate success to keep morale up and make time for relaxation as a team. Lastly it is important to be a role model, the actions of a manager is more closely scrutinized so it is important to not undermine the change management. (Nahavandi, 2009)

Impact of culture
Culture is an important factor to be aware of, people will behave in different ways because of their culture and it must therefore be taken into consideration when formulating strategies, such as change and ERP implementations. Culture is one of many things that give people their uniqueness, it differentiates one group of people from other groups. Culture affects people on many levels, how they behave, how they interact with each other and what they value amongst others. It shapes behaviours and it must therefore be taken into account when dealing with people. As written by Hammer & Champy (1993, p. 36) “A company’s prevailing cultural characteristics can inhibit and defeat a reengineering effort before it begins”.

Culture can be defined as the commonly held values held within a group of people, what norms, customs, values and assumptions that guide their behaviours (Nahavandi, 2009, p. 34). Culture exists on three levels; these are national, group or organisational culture. National culture is the set of values and beliefs that are shared by people from within a certain nation whereas group culture can be seen as a subset of national culture, even though they share the national culture groups can develop their own. Groups can be based on for example race, ethnicity, language, religion or gender among others. The last level is organisational culture, over time all organisations develops its own corporate culture. The organisational culture often consists of work related values and beliefs, such as beliefs about leadership which can be deeply rooted. (Nahavandi, 2009)

In organisational culture, Detert, et al. (2000) proposed a framework of how to classify an organisation based on eight cultural dimensions. These dimensions were further built on by Jones, et al. (2006) where they explored how these dimensions affected knowledge sharing during ERP implementations. The eight dimensions and how they should be dealt with are:

**Orientation to change (stability vs. change)**
This dimension explore how change oriented the organisation is. Learning organisations, as talked about above, will be more accepting to change than an organisation which is stability oriented. The preferred configuration for increased knowledge sharing is change since ERP implementations require changes to be made throughout the organisation. If the cultural configuration is towards stability then an initiative that can be made is to organise the implementation teams around processes rather than functions. This will help with the integration of processes. (Jones, et al., 2006)

**Control, coordination, and responsibility (concentrated vs. autonomous decision making)**
This dimension of culture looks on decision making and where the decisions are made. It explores if decisions are made centrally or throughout the organisation. Either category is fine for successful knowledge sharing, the most important factor is that there is consistency over time. A result of ERP is that decision making gets decentralised, for this to work implementation teams must share knowledge regardless of how they are used to working. If there are issues with organisational hierarchies carrying over to the implementation team this can be solved by eliminating seniority and functional distinctions in the teams. That will encourage people of all hierarchies to share ideas without fear of blowbacks. (Jones, et al., 2006)

**Orientation to collaboration (isolation vs. collaboration)**
This dimension explores if people believe that working collaboratively or individually is better. A belief can be that teamwork is inefficient and therefore most work is done individually. Collaboration is one of the most important factors to knowledge sharing and is therefore an important cultural configuration, knowledge sharing must be facilitated. If team members only share knowledge with people they are familiar with a solution might be to structure the teams in a podville structure. Podville is when team members are put in close proximity to each other in a kind of pod. By eliminating the physical distance knowledge sharing is more likely to occur. (Jones, et al., 2006)
Basis of truth and rationality (hard data vs. personal experience)

This dimension explores what people believe to be considered truth. In some organisations it can be knowledge that is attained through systematic, scientific studies and then codified, in other organisations it can be that the knowledge is based on intuition and experience. For successful ERP implementations the teams should be sharing both experiential and hard data. If team members are discouraged from knowledge sharing then formal and informal team building exercises can be used to counteract that. It will encourage team members to share knowledge and listen to others. (Jones, et al., 2006)

Motivation (external vs. internal)

This dimension looks on how employees should be motivated. Either it is believed that employees have a desire to perform well on their own or that they need outside motivators, such as incentives, to perform well. If incentives are used within an organisation however it may create a culture where team members compete with each other instead of working together. These issues can be resolved by providing equal bonuses for all team members, it will reduce the tendency to hoard knowledge for personal gain and instead provide incentives for increased collaboration. (Jones, et al., 2006)

Orientation to work (process vs. results)

This dimension looks at if individuals are more concerned with work itself or if the working process is seen as a means to reach desired results. If an organisation is result oriented it may put pressure on team to meet deadlines and since the preferred configuration for knowledge sharing is process oriented, teams should be given the time to rethink situations. By extending deadlines if necessary and putting focus on gathering the right knowledge organisations can break the barrier and improve knowledge sharing. (Jones, et al., 2006)

In their study Jones, et al. were not able to draw conclusion about either of the last two dimensions, orientation and focus, and nature of time horizon since all the firms in the study had the same cultural configurations. The orientation and focus dimension addresses the relationship between the firm and its environment. It explores if the organisation is driven by internal process improvements or external stakeholders desires. Nature of time horizon dimension explores whether the time horizon for decisions primarily is long or short term. (Jones, et al., 2006)

2.2.5 Knowledge management

A change to a new ERP system can be complex and affect the whole organisation, it generates a lot of new knowledge that needs to be managed and shared. It is therefore important to have good structures in place in order to allow it to be managed and shared throughout the organisation. Knowledge is defined by Gammelgaard & Ritter (2000, cited in Al-Alawi, et al., 2007) as a combination of experience, values, contextual information and expert insight that help evaluate and incorporate new experience and information. Knowledge can be classified into two categories, either explicit or tacit (Polanyi, 1966 cited in Bartol & Srivastava, 2002). Explicit knowledge is knowledge that can be codified and transferred in a formal language, in contrast tacit knowledge is difficult to codify in a formal language. This means that how to share knowledge depends on what type of knowledge is going to be shared, explicit knowledge for example can be shared through verbal communication while tacit knowledge is better shared through socialisation, observation and apprenticeship. (Bartol & Srivastava, 2002) Several ways to encourage knowledge sharing is presented in Table 5 (Al-Alawi, et al., 2007):
Table 5. Factors to improve knowledge sharing

<table>
<thead>
<tr>
<th>What</th>
<th>How</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinforce trust</td>
<td>It is important to reinforce trust between co-workers, this can be achieved by arranging social events. These events encourage the building of informal friendships and help co-workers overcome potential stress.</td>
</tr>
<tr>
<td>Greater interaction</td>
<td>Since communication is vital, redesigning the offices to allow greater interaction and communication between employees can improve knowledge sharing.</td>
</tr>
<tr>
<td>Job rotation</td>
<td>Job rotation can be used as a strategy to facilitate knowledge sharing within the organisation and also keep motivations up.</td>
</tr>
<tr>
<td>Strong relationships</td>
<td>It is important to have a strong relationship between top management and employees, it is also important that top management communicate the importance of knowledge sharing for the continued success for the organisation.</td>
</tr>
<tr>
<td>Information systems</td>
<td>There needs to be information systems to share knowledge in order to encourage knowledge sharing between functions.</td>
</tr>
<tr>
<td>Incentives</td>
<td>While bearing in mind the different employees needs and objectives, providing incentives to reinforce knowledge sharing is important.</td>
</tr>
<tr>
<td>Reducing boundaries</td>
<td>Hierarchal structures can counteract timely communication and therefore decrease knowledge sharing, by reducing boundaries participation in decision making can be increased leading to an increase in the vertical information flow.</td>
</tr>
</tbody>
</table>

2.3 Control mechanisms

The way people are organised and controlled affect the way they work and how they adapt to change and overcome barriers. This includes the way the organisation is structured and other formal and informal control mechanism such as budget and culture. It is important that the control mechanisms fit with the work or culture of the organisation to get the most out of the available resources.

2.3.1 Organisation

There are multiple ways of how organisations can be structured; each way has its own set of benefits and drawbacks (Hobday, 2000). The way that the organisation is structured affect how employees can be managed and it can therefore help or hinder change, such as the implementation of an ERP system, the organisational form must therefore be taken into consideration when formulating strategies. The most relevant structures for this study is the functional, project and matrix organisations.

Functional organisation

A functional or otherwise called hierarchal or line organisation means that that the organisation is divided into functions, for example administrative, development, production and marketing & sales. This means that each function specialises within their area. By using a functional organisation it creates a big need of coordination between the different functional groups. A common problem with this type of organisation form is that co-workers in a specific functional group will start to see things from their point of view and thereby creating their own ideas of the company’s missions and goals which can create conflicts in the organisation. An example could be that production will want to have long-running production series with standardised products whilst marketing & sales wants to have customizable products with short lead times. (Bruzelius & Skärvad, 2008)
**Project organisation**

In some organisations situations occur where work tasks which currently don’t really adhere to any of the existing functions need to be performed. If the work task is unique and won’t be repeated it is then unnecessary to change the organisational structure and create new permanent units to take care of the work tasks. In these types of situations the project organisation is appropriate. A project organisation is of a flexible nature where projects can be put together of varying size and time durations. (Bruzelius & Skärvad, 2008)

**Matrix organisation**

A matrix organisation combines two or more organisational forms, for example a functional and a project form as can be seen in Figure 6.

![Balanced matrix organisation](Hobday, 2000, p. 877)

This results in that each employee can have two managers to answer to and take directions from. The benefit of a matrix organisation is that it creates lateral communication channels which increases communication within the organisation which means that it also increases the amount of information that the organisation can handle. Since it improves communication it allows for resources to be used more effectively and also with higher flexibility. Since a matrix structure allows people to have the opportunity to work in a variety of projects it is generally believed that it leads to increased individual motivation, job satisfaction, commitment and personal development. (Ford & Randolph, 1992)

Some of the reasons that enable the benefits to be realised also cause issues with matrix organisations. The two classic principles of traditional structures are “Authority should equal responsibility” and “Every subordinate should be assigned a single boss” (Ford & Randolph, 1992, p. 275), the matrix structures clearly break these principles which can cause friction. The fact that employees have two or more managers causes ambiguity and conflicts over the use of resources, pay and employee assignments. The most common issues that arise between functional and project managers are over project priorities, administrative procedures and performance trade-offs. Conflicts can also arise between employees who have different backgrounds, work orientations of time horizons or even val-
ues. Functional managers often experience insecurity and an erosion of autonomy when moving over to a matrix structure. This can lead to resistance and hostility towards a matrix structure. One of the most apparent disadvantages is cost, on both the organisational and individual levels. For the organisation the cost comes from an increase in management, more meetings (which in turn can lead to increased decision lead times) and increased information processing costs. The costs for the individual are mostly due to the fact that matrix organisations introduce a lot of ambiguity, with for example authority. (Ford & Randolph, 1992)

**Parts of an organisation**

An organisation is made up by several distinct parts that fulfil different needs and the coordination mechanisms between them can look different, to describe these mechanism it is first necessary to introduce Mintzberg’s model of an organisation. Mintzberg (1989) describes an organisation as consisting of six parts that arises over time as the organisation becomes bigger and more complex, Figure 7 shows how they fit together.

![Figure 7. Mintzberg's six basic parts of an organisation (Mintzberg, 1989, p.99)](image)

The first one is the operating core where the people that work to produce the products and services are located. They are overseen by the strategic apex that has at least one full-time manager to manage the whole organisation. The middle line is formed when the organisation becomes even bigger, with more managers to manage the operating core and other managers. Even more complex organisations have a group of analysts to plan and control the work done by others, they make up what Mintzberg calls the technostructure and lies outside the hierarchy formed by the operating core and management since it only influence the operating core indirectly. Another such group is the support staff that performs internal support services such as cafeteria, mailroom or legal counsel. This is also where Mintzberg places public relations and research & development. The final of Mintzberg’s basic organisational parts is the ideology, or culture, that encompasses the whole organisation with its traditions and beliefs. (Mintzberg, 1989)

2.3.2 Management coordination mechanisms

In order to formulate a management strategy, the management has to define goals and missions for the unit or organisation in question (Nilsson, et al., 2010). These goals and missions can then be used
together with external influences such as environmental and legal regulations to define what the management should look like in that organisation. There are several different ways of managing people in organisations, from centralized to decentralized, from formal to informal. Henry Mintzberg (1989) put forth a framework of coordination mechanisms that describe how organisations coordinate their work. (Mintzberg, 1989, pp. 101-102) (Nilsson, et al., 2010)

*Mutual adjustment* is when people informally talk to each other to adjust to each other’s needs. It requires that they have worked together for a while and have a shared trust. This usually happens between two operating employees.

*Direct supervision* is when one person is constantly present and gives direct orders or instructions to several others, such as a boss giving detailed instructions to employees. This has the risk that no actions are taken unless they have been explicitly instructed by the manager.

*Standardisation of work processes* is done by defining what to do and in what order, for example by training, following manuals or using standardized routines in IT-systems such as ERP-systems. The instructions are usually developed by the technostructure and used in the operating core.

*Standardisation of outputs* defines the expected results but does not describe how to achieve them, that is left to the people in the organisation to decide. Example of this could be financial targets for a unit or specifications of a product that should be developed.

*Standardisation of skills and knowledge* is coordination by the training and certificates the people are required to have to perform their tasks. Professions such as medical doctors, teachers or priests are examples of where the workers are expected to know what to do without much external management.

*Standardisation of norms* is when everyone in the organisation follows the same set of beliefs, it could also be seen as an ideological way of coordination as in a religious order.
2.3.3 Management control system as a package

Another way of looking at coordination within an organisation is laid forth by Malmi and Brown (2008) in their framework of management control systems as a package. In an effort to aid further research and reasoning about management control systems they presented a general view of five categories that make up the whole management control system package, shown in Table 6. The framework describes the different ways how management can control the people within an organisation, both formally and informally. When a large change, such as an ERP implementation, is done it is important to understand what can be done to achieve the sought after effects.

Table 6. Management control systems package (Malmi & Brown, 2008, p. 291)

<table>
<thead>
<tr>
<th>Cultural Controls</th>
<th>Values</th>
<th>Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long range planning</td>
<td>Action planning</td>
<td>Budgets</td>
</tr>
<tr>
<td>Cybernetic Controls</td>
<td>Financial measurement systems</td>
<td>Non-financial measurement systems</td>
</tr>
<tr>
<td>Administrative Controls</td>
<td>Governance structure</td>
<td>Organisation structure</td>
</tr>
<tr>
<td>Reward and Compensation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Cultural controls* – Three aspects of culture is considered in this framework; value-based, symbol-based and clan-based controls. Value controls are used by senior management to define what values the employees should have and can be implemented in different ways. One way is to only recruit persons with the desired values, another is by changing the individual’s values by various means and the third is to explicitly demand that employees behave according to a set of defined values even if they personally do not adhere to them. Symbol-based control is the way of using symbols such as uniforms or workspace design to create a desired culture. An open plan office can for example be used to foster a collaborative and open-communication culture and uniforms can be used to establish a culture of professionalism. Clans are the label given to subcultures within organisations such as people with similar skill-set or belonging to a certain organisational unit or division. Clans each have their own ceremonies and rituals that help establish their control through values and beliefs. (Malmi & Brown, 2008)

*Planning* – Planning is a way of controlling what should be done by setting goals and standards to reach, thereby controlling the level of work expected by the organisation. Malmi & Brown differ between action planning and long-range planning. Action planning is the tactical planning of up to a year with defined goals and actions. Long-range planning is the strategic planning that spans over a few years. Planning also involves making sure the functional units are working together by aligning their goals together. In this framework, budget or other financial plans is not part of planning, but belongs to the cybernetic controls. (Malmi & Brown, 2008)

*Cybernetic controls* – Cybernetic control is defined as having a feedback loop that measure and reacts to system performance by comparing it to a set standard and modifying the system’s behaviour accordingly. It can be used as a decision support system that feed information to managers and thereby influences their actions, but when it is used to affect behaviour by setting targets and measuring them, it can be seen as a management control system. The characteristics of cybernetic control
of a system are that there exists quantifiable measures, there are set targets or standards, it is possible to compare the targets with the outcome, and it is possible to modify the system. There are four essential types of cybernetic control according to Malmi & Brown (2008), budgets, financial measures, non-financial measures, and hybrids. The most fundamental of them is the use of budgets that is used in most organisations. It is used as a control system by setting the acceptable level of performance and comparing with the outcome. Financial measures are those that measures more narrow financial targets such as a minimum level of return on investment or economic value added. Non-financial measures can be used in addition to the previously mentioned controls as a way of overcoming their perceived limitations. One example of non-financial measurements is quality measures. By mixing financial and non-financial measurements a hybrid control is formed, one example of such a control is the balanced scorecard. (Malmi & Brown, 2008)

**Reward and compensation** – Rewards and compensations can be used to ensure that the goals of the individuals are compliant with the goals of the organisation. By using rewards, management can signal what they find is important with the hope that it will lead to increased effort by the individuals. There are three ways in which extrinsic rewards such as monetary bonuses can have an impact: effort direction, where the focus should lie; effort duration, how long to focus on something; and effort intensity which is how much effort is devoted. Rewards can be both individual and aimed at groups. (Malmi & Brown, 2008)

**Administrative Controls** – Organisation, governance structures and procedures and policies are part of what Malmi & Brown (2008) calls administrative controls. It affects employees’ behaviours by how they are grouped, who they are accountable to and how the various activities should be performed. The governance structure relates to the lines of authority and how organisational units coordinate their efforts, for example by having mandatory meetings. (Malmi & Brown, 2008)

2.3.4 Performance management system framework

Another more extended framework pertaining to management control systems is the one designed by Ferreira & Otley (2009). While Malmi & Brown (2008) attempts to create a framework to aid discussion about management control as a package, Ferreira & Otley (2009) goes more into detail on how the steps in their framework fits together with a logical flow from vision to usage. They chose to use what they consider a more general description of performance management system that includes management control systems but expands upon it. Their view of a performance management system is:

“[...] the evolving formal and informal mechanisms, processes, systems, and networks used by organizations for conveying the key objectives and goals elicited by management, for assisting the strategic process and ongoing management through analysis, planning, measurement, control, rewarding, and broadly managing performance, and for supporting and facilitating organizational learning and change.” (Ferreira & Otley, 2009, p. 264)

While the framework by Malmi & Brown (2008) is presented as a list of controls without relative order, Ferreira & Otley (2009) presents their framework as a series of questions that build on each other. The framework consists of 12 questions, as can be seen in Figure 8, which aims to illustrate the whole management environment within an organisation. If either step is considered problematic it could affect the subsequent steps with a problematic performance management as a result. If the
barriers to using the ERP system is because of performance management it is valuable to identify where the problems originate to be able to rectify the situation.

![Image: Performance management systems framework]

**Figure 8. The Performance management systems framework (Ferreira & Otley, 2009, p. 268)**

The first question is about the vision and mission. The purpose of the vision is to describe a desired future state the organisation aspires to reach, and the aim of the mission is outline the purpose of the organisation. They are both part of the beliefs system. The focus of this question is to find out not only what the vision and mission is, but also how the information and values are communicated throughout the organisation as a way to affect behaviour. While Malmi & Brown (2008) also deals with values and mentions vision as part of that, they do not go deeper into how it is used since their purpose is to provide the terminology rather than examining the situation at an organisation. The vision defines what the key success factors needs to be, key success factors are activities, attributes, competencies and capabilities that are critical to success for an organisation and are necessary to achieve in order to advance towards the organisation’s vision. Key success factors are what the involved managers consider important; they are not objectively true as viewed from an outside perspective. Key success factors represent the vision and mission in a shorter perspective, managers could for example consider production transfer to low-cost countries to be a key success factor if their vision is to be an industry cost leader. (Ferreira & Otley, 2009) The identification of key success factors is another thing not described by Malmi & Brown (2008) but according to Ferreira & Otley (2009) it is used to determine strategies and plans and organisation structure which are part of Malmi & Brown’s (2008) framework but viewed from a different angle.

The organisation structure plays a big role in the efficiency, motivation, information flow, and control systems of an organisation. It determines the distribution of responsibility and accountability of the organisational units; it decides not only what should be done but also what should not be done. The form of organisational structure that is used is based on the desired level of centralisa-
tion/decentralisation, differentiation/standardisation and configuration. The configuration consists of structures, processes and relationships. Structure includes functional, matrix, and team-based; processes can be e.g. business or market processes, and relationships include internal and external such as outsourcing or strategic partners. The key success factors are important in determining the organisation structure, if a key success factor is to be able to respond quickly to market changes, the structure, processes and relationships need to be designed with that in mind. Malmi & Brown (2008) makes no mention of what affects the organisational structure but they mention it as something managers can use as a control mechanism which is also what Ferreira and Otley does. Malmi & Brown (2008) choose to separate organisational structure and governance structure which is something that Ferreira and Otley does not, which shows that the governance structure does not have to be the same as the organisational structure.

Strategy and organisation structure are affected by each other, one type of strategy can demand a certain structure but existing structures can limit the scope managers can have to develop new strategies. The strategies and plans are the fourth question; the strengths need to be developed to fit the identified key success factors by translating strategic goals to operational goals. This question focuses on comparing the actions taken by management with the desired outcomes, and how the strategies and actions are communicated throughout the organisation since lack of sense of direction is a major control problem. If the strategy and plans are not communicated efficiently individuals may not understand how their actions contribute to the overall strategy. Furthermore, it is relevant to understand how strategies and plans are generated, either top-down by managers alone, or bottom-up where all levels of the organisation are involved. By adopting a bottom-up process, members of the organisation may feel more empowered and contributes to a greater understanding of the planned actions. (Ferreira & Otley, 2009) See the Change management chapter for more on bottom-up change. The planning section of Malmi & Brown’s (2008) framework addresses long and short term planning but does not go into the same depth as Ferreira and Otley.

Key performance measures are the metrics used to evaluate how the goals, key success factors and strategies are succeeding, they describe what is measured. The fifth question includes how they are formulated and what role they have in performance evaluation. Specifying what is measured can have a big effect on individual behaviour. The things that get measured can drive out those that are not. Both financial and non-financial measures exist, such as the balanced scorecard. The targets for each of the measures are examined in the sixth question. Setting moderately difficult targets, 80 – 90 percent achievable, has been shown to enhance group performance, but when there is need for inter-group cooperation aggressive targets are not preferred since group managers become less willing to concede to others. Targets can be used for benchmarking with external measurements as a way to compare the organisation’s performance with others’. How the performance is evaluated signals, both formally and informally, what is important and thus what individuals focus their efforts on. There are both performance evaluation routines that often are carried out by human resources, and activities done by senior management. Evaluation does not have to be individual; it can be of groups such as teams, divisions or the whole company. Performance evaluations adhere to a scale from subjective to objective. Subjective evaluation is less rigid than objective and enables the evaluators to correct for flaws in the measurements, but it can be subject to bias as the weighing is not known by the evaluatee. Objective evaluations are suited for situations where the input-output relationship is clear and the performance is measurable. (Ferreira & Otley, 2009) Key performance measures and targets are contained in the cybernetic controls in the framework by Malmi & Brown.
but by separating them like Ferreira and Otley has done it becomes clearer what comes first and the importance of each becomes clearer.

The purpose of question eight is to examine if there are rewards based on the performance evaluations. They can be non-financial or financial, individual or group-based. Non-financial rewards can be such things as an expression of approval or recognition, or long-term career progression. Financial rewards, such as bonuses and increased salary, have been shown to improve performance quantity but not performance quality, and this effect decrease as the work becomes more complex. In addition to rewards, managers can also penalise subordinates based on the performance evaluation. This can also be both financial and non-financial. Group rewards can be used when an organisation is complex and when the individual performances are difficult to evaluate, but they can have problems with free riders. (Ferreira & Otley, 2009) Malmi & Brown (2008) also recognises rewards as a control mechanism and highlights their importance by not grouping them with cybernetic controls but having them separate.

According to Ferreira and Otley (2009), the way information flows within an organisation is central to the whole performance management system. It is how the organisation corrects for deviations from desired state and how it learns from past experiences to generate new ideas and strategies; this is the focus of the ninth question. Information systems are part of the information technology such as ERP systems. They are mostly used for accounting purposes but also for non-financial information. The structure of the information can be in the form of a budget or something broader such as balanced scorecard. Information could be stored in different systems, it could have a wide or narrow scope, the frequency of reporting may be of interest, among other issues. Information systems can be arranged in formal networks that only part or the organisation can view. Informal networks can also form and can play a vital part in how information spreads throughout the organisation. The use of the control system, which is question ten, can be classified as diagnostic or interactive that determines if the information is used to learn and improve, and if managers use it to evaluate the strategies. (Ferreira & Otley, 2009) While budgets and balanced scorecards are part of Malmi & Brown’s (2008) cybernetic controls, their framework does not mention the information paths or the usage of the performance management systems as control mechanisms the way Ferreira and Otley does, though they are in part contained in the administrative controls as the governance structure and policies and procedures.

The eleventh question examines what changes have been made in the performance management system and what the causes for those changes were; it is not about the change process itself. An example of this is if the key performance measurements are updated after a change to the strategy. How the performance management system change as a response to other organisational change, such as the implementation of a new ERP system, gives some information to how the different components interact, especially if anyone of them lags behind. In order for the performance management system to be worth more than the sum of its parts it needs to have strong links between the various components. A control system is often designed and implemented by different people and the links between them may have emerged rather than being planned, this is what the last question in the framework considers. (Ferreira & Otley, 2009)

The two frameworks from Malmi & Brown (2008) and Ferreira and Otley (2009) presents two different but similar viewpoints on management control systems. The one by Ferreira and Otley goes
deeper into the various parts and are laid out as a logical sequence of questions to ask in order to assess the situation while the framework by Malmi and Brown presents a typology of how to describe a management control system. That makes Malmi and Brown’s framework more flexible but it also presents aspects the Ferreira and Otley framework does not such as the clan and symbol controls in the cultural controls. Therefore the Ferreira and Otley framework will be used as the guiding framework to describe the management situation at Support and Services with the additional aid of Malmi and Brown’s framework to fill in some gaps. Both will also be used in the analysis to see what the performance management could look like.

2.3.5 Processes
As described by Mintzberg (1989) standardisation of work processes is one way of controlling work and is commonly found in matrix organisations. In order to overcome barriers, management needs to formulate strategies and follow up on them in order for change to happen. Processes enable the work to become transparent as clear roles can be formulated. Clearly formulated roles in turn make it easier to distribute responsibilities and can significantly shorten the time it takes to achieve benefits (Davenport, et al., 2004). The work in ERP systems is often structured as processes and as expressed by Harrington (1991): “The upper management provides the vision and directive, teams correct the problems, and individuals provide creativity, but it is the processes within any organisation that get things going”.

Definition
There are certain qualities a process should have, Rentzhog (1998, p. 30) defines it as “[…] a chain of activities which in a recurrent flow creates value for a customer”. A process has a clearly defined input and output; it consists of a limited amount of activities but it must have a clearly defined beginning and end. Usually a process has external or internal customers but also suppliers, which can be external and internal, internal here referring to inside one’s own organisation. Furthermore a process is characterized in that it describes a workflow that is repetitive in nature. That means that a workflow has to be repeated in order to be called a process, otherwise it is a project. A process describes sequences of workflows, networks and activities which are carried out in an organisation, these are things that happen naturally within an organisation, and calling it a process does not necessarily change it but rather gives it more focus. The process is in place to create value for a customer that can be an external or even an internal one. Lastly processes exist to solve a problem, therefore processes has to have specific aims and goals. (Sörqvist, 2004)

Process orientation
According to Hammer & Champy (1993) process orientation is required to better cope with competition. A way to improve an organisation’s competitiveness is by increasing its customer focus. It is also important to be able to adapt to changing demands which creates a need for the organisation to be flexible. To create an organisation that is flexible and has higher customer focus requires a better integration of the organisations processes (Nilsson, 2003). This will also lead to greater efficiency in the organisation according to Rummler & Brache (1995 cited in Nilsson, 2003).

In a functional organisation, different business areas strive to optimize the execution of the work done in their own organisational units. This is achieved by various means such as specialized software or outsourcing of whole organisational units. Such local optimisation is the result of a high degree of autonomy where business units take a large responsibility for their work and how it is man-
aged, but increased autonomy leads to high coordination costs because the flow of information between the organisational functions takes a long time. To decrease these times, by eliminating or reducing the effects of the inter-organisational interfaces, it is necessary to implement cross-functional business processes where the hand-offs between units are reduced or formalized. (Becker, et al., 2003).

**Process modelling**

As organisations grow, the complexity of the organisation increases. By creating process flow diagrams it is possible to create an understanding of how things work and thus reducing the effect of the complexity (Rentzhog, 1998). Employees will better understand their part in the process and how their work affects others, which in turn will create a better customer focus (Sörqvist, 2004). By using processes it also makes it easier to compare how different people work and therefore creates the possibility of knowledge transfer by people learning from each other. However, a process structure puts high demands on leadership which drives the need for good leadership up (Sörqvist, 2004). Becker, et al. (2003, p. 42) gives several reasons why a process modelling should be done that each have their own requirements of how they should be done and what they should contain.

**Organisational documentation** - Most companies have charts of their organisational structure but they usually don’t have detailed descriptions of their business processes. Process models could be used for increased transparency in how the organisation is working for the purpose of education or formulating job descriptions. Since such models should be understandable by all employees in a company, they must be simple and easy to understand. They also need to be updated on a regular basis to reflect the change of the underlying processes as processes by their nature change more frequently than organisational charts.

**Process-oriented reorganisation** - When an organisation is interested in doing a reorganisation towards a process-oriented organisation, process models are vital since they help identify what processes exist in the company, and their weaknesses.

**Continuous process management** - The finished models should be continuously updated and compared with reality to verify that they still match. If they do not, either the model could be deficient or the process execution could have changed since the model was made and become less efficient. Depending on the situation, models and their attributes could be updated automatically via an automatic monitoring system. These systems should also support early warnings for when the processes deviates from the target. The models used for this purpose could also be used for activity based costing to keep track of where the cost is generated.

**Benchmarking** - Process models allows for comparison of the performance and setup of the processes with other internal or external sources supposed to represent best practice. Such benchmarking requires that related and comparable processes are available and that the proper attributes are included in the models. In organisations that have processes of identical structures in different organisational areas internal benchmarking can be used.

**Selection of ERP-software** - ERP software functionality is often described by the vendor with process models. Comparing how well these reference models fit with the processes in the company is one way of evaluating how well suited an ERP system is for the company. It is often necessary to make
the company specific models in the same manner as the ones from the vendor since different modelling techniques can be hard to compare.

**Workflow management** - Becker, et al. (2003) calls a process that is fully or semi-automated with centrally controlled transitions of functions a workflow. A process can potentially be turned into a workflow if it is well-structured and is commonly enough performed. Models pertaining workflow processes need to have defined roles and input and output data including their data structures.

**Understanding the process**

According to Rentzhog (1998) a common way to create an understanding of how a process works is by systematically breaking the process down into sub-processes. For each level certain properties should be documented, such as customers, suppliers, input, output, roles, strengths, weaknesses and problems. While this can be a good approach there is a potential risk that by trying to include too many details it is easy to get stuck in this phase. Deciding how many sub-processes a process should be divided into depends on the complexity of the process.

From a management perspective it is not important to go into great detail when breaking down processes. This is since the goal is simply to create an understanding for the persons in the process of how their work relates to the processes overall goal, which is creating value for the customer. By creating an overall view of the process it enables management to break down their strategic goals into goals related to sub-processes, which is important since by improving sub-processes the overall process will benefit. (Rentzhog, 1998)

Handovers between people or functions generally leads to loss of information, impaired reversal, and uncertainty in responsibility in addition to slowing down the process. To manage these issues it is important to clarify where these handovers take place in the process maps (Rentzhog, 1998).

### 2.3.6 Resource and flow efficiency

Companies wants to get the most out of their resources in order to minimise overhead and generate as much value as possible; this is usually done by dividing large jobs into smaller jobs that can be done efficiently at separate stations with no waiting or set times. This gives a high resource efficiency with the purpose to minimise the opportunity cost of having a resource being unused. The resource efficiency for a resource is the time that resource spends doing work divided by the time of a certain time period. The aim of resource efficiency is to maximise value-adding time. (Modig & Åhlström, 2012)

Modig & Åhlström (2012) defines flow efficiency as being focused on a flow unit in production instead, and looks at the time a unit takes to go through production. A flow unit is whatever the focus lies on in the relevant process, it could be a production unit or customer order. It is calculated as the total value adding time divided by the total time from the moment a need is identified to the time it is satisfied. It is a matter of definition when the need is identified, it could be when the customer places an order or when the customer first realise that there is a need and starts thinking about placing an order. The aim of flow efficiency is to maximise value-receiving time. (Modig & Åhlström, 2012)

Focusing on high resource efficiency will negatively affect flow efficiency which Modig & Åhlström (2012) calls the efficiency paradox. One reason for this is that in order to utilise a resource efficiently
there can be no waiting time despite some minor variations. The solution is often to have an inventory between each resource where production units are waiting to be processed, that means the resources can work continuously but makes the total throughput time longer; the higher the variation, the larger the inventory needs to be. The three major sources to variation according to Modig & Åhlström (2012) are resources, flow units and external factors. Machines can break down or be confusing to use, some flow units require different type of processing and some variations are not controllable by the organisation.

Low flow efficiency corresponds to a long throughput time which can generate secondary needs in addition to the primary need that the organisation was supposed to fulfil. Such secondary needs can be double work, lost memory, bad cash flow and lost customers. Secondary needs arise from handling many flow units simultaneously and can lead to problems due to lack of overview, for example if there are many emails in an inbox or the organisation has many customers waiting on their orders. Other causes of secondary needs are handovers and restarts on the same flow unit. A handover is when a flow unit is passed between stages in the process from one resource to another and can generate extra work or defects when the stages lack in communication. Restarts of the same flow unit occur when work on one unit is too complex to finish the first time so it gets processed multiple times. (Modig & Åhlström, 2012)

Secondary needs are unwanted since they lead to superfluous work, work that is only dedicated to fulfil secondary needs. Superfluous work is not value-adding but may appear to be since work is being done. E.g. talking to a customer that worries about the delivery time of a placed order may seem value-adding but is superfluous since that customer would not have contacted the organisation if the order had been fulfilled more quickly. This superfluous work is the cause of what Modig & Åhlström (2012) calls the efficiency paradox. A strong focus on resource efficiency ends up hampering flow efficiency that leads to unnecessary extra work taking up the resources time. Modig & Åhlström (2012) classifies the different states in the efficiency matrix shown in Figure 9.

![Efficiency Matrix Diagram](image_url)

Figure 9. The efficiency matrix (Modig & Åhlström, 2012, p. 96 & 101)
In the **efficient islands** state the resource efficiency is high with different parts of the organisation working in isolation but with low flow efficiency. This corresponds to high inventory and long waiting times. **Wasteland** is the most undesirable state with no type of efficiency. The **efficient ocean** has efficient flow but waste a lot of resources with low utilisation. It has a big focus on meeting the customer’s need. Reaching the **perfect state** is difficult as mentioned because of the efficiency paradox. The main reason is the variation that creates an efficiency frontier that limits how high the organisation can get; higher variation pushes the frontier lower. To push the frontier back, the organisation needs to be able to predict the demand and have flexible resources to adapt to variation in supply. Modig & Åhlström (2012) describes lean as the operating strategy of moving up and to the right in the efficiency matrix which involves focusing on flow- rather than resource efficiency.

### 2.4 Model of analysis

Figure 10 depicts a state diagram of the post-implementation state that Support and Services is in, showing that some barriers are keeping Support and Services from changing state to the improved future state. At the moment Saab Support and Services is in a troublesome post-implementation phase where they are having issues related to the ERP system. Some barriers are keeping them in this state and preventing the transition to the next, improved state. By looking at what benefits, pitfalls and success factors there are with ERP systems in general, combined with the theories of change management and control mechanisms, the issues currently present will be analysed to find the underlying barriers. It will also be examined how using change management and management control would make it possible to transition to the next state.

![Figure 10. State diagram of current and sought after states.](image-url)
3 Methodology

3.1 Research strategy

The two most common ways to conduct research is to use either a qualitative or a quantitative research strategy. The term qualitative research is very broad and can mean several different things but according to Denzin & Lincoln (1998) qualitative research is multi-method in focus and involving an interpretive approach. Bryman (2012) describes it as inductivistic, constructionistic and interpretivistic. It is more focused on soft data such as unstructured interviews and texts, in contrast to a quantitative strategy that is based on numbers and statistical methods (Patel & Davidson, 2011). A qualitative strategy is suitable for studies that are based on written words, in-depth analysis and of lesser scale. It allows ideas and methods to evolve during the ongoing study, which matches the execution of this study well (Denscombe, 2009); the strategy chosen for this study has therefore been a qualitative one. Based on the purpose of identifying barriers to beneficial use in the post-implementation phase, an exploratory approach was used which aims to gather new information to fill gaps in the existing knowledge by obtaining as much information as possible within a specific problem domain (Patel & Davidson, 2011). The existing literature corpus describes the pre-implementation and implementation phases well but lacks in its description of barriers in the post-implementation phase which is why the exploratory approach was used in this study. It aims to explore what problems arise in this phase and what could be done to move past them.

3.2 Study design

The starting point of the study was a case at Saab where a division had recently implemented a new ERP system; the case formed a case study that was done with a grounded approach as a way of collecting empirical data. A case study is defined by Yin (2007) as an empirical investigation that studies a contemporary phenomenon in its true context, especially when the borders between the phenomenon and the context are unclear. The distinctive characteristic of a case study is its focus on one research unit, or in some cases a few, its purpose is to study a phenomenon in-depth, which in this study is the problematic usage of the ERP system (Denscombe, 2009). The grounded approach comes from grounded theory that according to Denscombe (2009) is well suited for exploratory, small-scale projects using qualitative data. The purpose of grounded theory is to generate theories rather than testing existing ones, therefore the collection of empirical data was started before the construction of a frame of reference. The reference material was selected in part based on the findings from interviews and observations. This is consistent with inductive reasoning where conclusions and theory are generated from observations of reality, in contrast with deductive reasoning that instead verifies theories by observations and research. A third line of reasoning is abduction that combines the two others by formulating a preliminary theory from observations, tests it with new observations and further develops the theory (Patel & Davidson, 2011).

The case study included two helicopter maintenance programmes, MPA & MPB, at Saab Support and Services that were chosen because they were both within two years of an ERP implementation and their organisations were easily accessible. The first programme was used as an introduction of how Support and Services work with the ERP system while the second programme further built on that since it is more complex.
3.3 Data collection methods

3.3.1 Interviews
Different types of information are best acquired through different types of data collection methods. Interviews are well suited when looking for opinions, experiences and privileged information from people in key positions (Denscombe, 2009), and in this study unstructured and semi structured interviews were used. Structured interviews are strongly controlled by the researcher with prepared questions and follow a predetermined path. It is suitable for collecting quantitative data that is easily standardised and is often associated with surveys (Denscombe, 2009). Semi structured interviews are prepared with a list of subjects and questions to bring up but allows for more flexibility during the interview for the interviewee to further develop the answers. Unstructured interviews are even less controlled by the researcher and more for the interview subject to develop her ideas with just some theme for the interview (Denscombe, 2009). Since the design of the study were grounded the interviews started out unstructured to allow for more discoverability of the issues, and moved to more semi structured after a while when the situation had become clearer. Leading questions have been avoided and follow up questions were asked when appropriate. None of the interviews were recorded due to security policies at Saab, but the researchers were both present at all interviews and took turns asking questions and taking notes. The notes were compared after the interviews and consolidated in one document.

The sampling of interview participants was done by snowball and subjective sampling. Snowball sampling is when the interviewed persons suggest other people for the researchers to talk to and was done at the beginning of the study in order to get started. When the researcher has some knowledge about the people or phenomenon that is going to be studied and it is believed that they can generate the most useful data, subjective sampling can be used to selectively choose participants (Denscombe, 2009). As the situation at Support and Services became clearer for the researchers, subjective sampling was used and participants were chosen because of their roles in the studied programmes.

Table 7 shows the persons interviewed, how many times, and which of the studied programmes they were part of, the interviews ranged from 30 minutes to 2 hours. The interviews were performed throughout the first four months of the study. The interviewed persons were chosen because of their diverse roles in the programmes in order to get a broad set of viewpoints of the situation. They enabled a deeper understanding of the situation at the studied programmes and how the ERP system is used differently by different users. These employees use the ERP system in different ways and get different benefits from it, they also experience different issues which has helped in creating a diverse understanding of the studied situation.

Table 7. List of interview participants

<table>
<thead>
<tr>
<th>Interviewees role</th>
<th>Count</th>
<th>Programme affiliation</th>
<th>Number of interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programme manager</td>
<td>1</td>
<td>MPA</td>
<td>4</td>
</tr>
<tr>
<td>Maintenance manager</td>
<td>1</td>
<td>MPA/B</td>
<td>1</td>
</tr>
<tr>
<td>Workshop manager</td>
<td>1</td>
<td>MPB</td>
<td>1</td>
</tr>
<tr>
<td>System admin</td>
<td>2</td>
<td>MPA/B</td>
<td>3</td>
</tr>
<tr>
<td>Planner</td>
<td>1</td>
<td>MPA</td>
<td>2</td>
</tr>
<tr>
<td>Logistics</td>
<td>2</td>
<td>MPA</td>
<td>2</td>
</tr>
</tbody>
</table>
3.3.2 Participatory observation

We have during the process of working on the study been sitting in an office at Support and Services where many of the interviewees reside. This has enabled us to have informal conversations and participate in activities with some of the employees, this has enabled us to gain insight which would have been difficult to gather through interviews. Observations can be done in either a structured or unstructured way, in this study unstructured observations have been done. Structured observations assume that there is a specific issue that can be observed under given situations while unstructured observations are done all the time without a given schedule (Patel & Davidson, 2011). This type of observation is called participatory observation, with the observers participating in the group to gain insights in the culture and allows for more comprehensive observations (Denscombe, 2009).

There are four different roles with varying degree of participation and hidden identity described by Gold (1958) named: complete participant, participant as observer, observer as participant and complete observer. As complete participant the researcher acts covertly and participates in the observed environment as part of the group, for example by pretending to be a co-worker. The other extreme on the scale is the complete observer role that looks at the environment from the outside with no interaction with the informants, for example by eavesdropping. The role of participant as observer involves being at location but not participating in the daily work while still conducting interviews and informal observations, Gold (1958) describes it as being commonly used in community studies. The fourth role is observer as participant where the researcher visits only to perform formal interviews with brief contact with informants. (Gold, 1958)

This study has been conducted at location with both formal an informal observations while being open about the role of researcher and not participating in every-day work, which categorises the researchers roles as participant as observer.

Table 8. The roles in participatory observation (Gold, 1958)

<table>
<thead>
<tr>
<th>Role</th>
<th>Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete participant</td>
<td></td>
</tr>
<tr>
<td>Participant as observer</td>
<td>✓</td>
</tr>
<tr>
<td>Observer as participant</td>
<td></td>
</tr>
<tr>
<td>Complete observer</td>
<td></td>
</tr>
</tbody>
</table>

3.3.3 Books and articles

The sources of data for the frame of reference were books and peer reviewed articles. The articles were selected by researching keywords such as ERP, management control and post-implementation in the library’s article database, by looking at the bibliography of articles and by recommendations from the supervisor. The list of articles was narrowed down by reading through the titles and abstracts and then assessing how relevant they would be to the purpose of the thesis by looking at what information could be gained from them, as well as looking at if the authors were previously known. If the subject of an article was relevant to the purpose but not the specific situation at Support and Services it was saved for later reading if time permitted.

The book selection was done by browsing relevant bookshelves of the library and looking for appropriate subjects in the titles, table of contents and also looking for authors known from previous courses. We looked at recommendations from our supervisor and bibliographies of other articles,
theses and books for further literature to read. When searching the literature we were looking for theories and recommendations to use.

3.3.4 Internal documents
In order to gain knowledge we have studied internal documents to get a better understanding of the situation at Support and Services. We have read articles published on the intranet and read newsletters to create an understanding of what is communicated to the employees and how. We have been able to take part of data not readily available from outside of Saab, such as statistics, informal work routines, process descriptions et cetera.

3.4 Data analysis
The analysis of qualitative data follows five steps according to Denscombe (2009); preparation, familiarity, interpretation, verification and presentation of data. The raw data should first be prepared in an organised way to allow for easier analysis. This was done by entering all notes and other data in a mutual electronic database that allowed for comments and search as soon as the interviews were finished. The data should then become familiar in order to be able to put it into context and find underlying meanings and themes. The notes and other data were read and discussed and shared themes and issues were compiled in separate documents. It was interpreted with the help of fish bone diagrams before being presented in the Analysis chapter. In order to verify that the analysis results are correct, the results have been compared to the theory from the frame of reference, the answers of separate interviewees have been compared with each other and the empirical data have been shown to participants of the study to ensure the analysis is not based on faulty data.

Part of the analysis of qualitative data is to find and define keywords or other distinctive pieces of data that can form a hierarchy of categories and concepts in a process known as codification (Denscombe, 2009). The codification started after each new interview when keywords were identified and common themes written down in a separate document. They were continuously compared and used to formulate new questions, as is part of the grounded approach (Denscombe, 2009).

3.5 Quality of research
The quality of a study is commonly determined by its internal and external validity, reliability, and objectivity (Denscombe, 2009). The terms are used extensively in quantitative research but their use in qualitative research is not always clear, it is not possible to repeat qualitative research with the same conditions for example. Other analogue terms have therefore been proposed by Lincoln & Guba (1986) to be credibility, transferability, dependability and confirmability. The techniques for ensuring credibility include prolonged engagement, triangulation of data and member checks. Prolonged engagement is described as lengthy and intensive contact with the respondents; in accordance with the grounded approach the study have taken place at the organisation studied over several months and some respondents have been interviewed several times. Multiple data sources have been used, both separate interviewees and written material, and the study have been done by two researchers, two ways that Lincoln & Guba (1986) brings up as a way of triangulation. By asking the same questions to more than one respondent we were able to get more than one perspective on the matter, which was valuable even though no disagreements were found. When codifying the data after interviews and as part of the analysis it was done separately by the researchers at first before it was combined by discussing the parts that differed in order to reach consensus. Data discovered in interviews was sometimes overlapping with data found in documents which strengthened the credi-
bility of it. The types of triangulations used in this study was therefore data triangulation, investigator triangulation and methodological triangulation (Denzin, 1978).

Member checks is the same as respondent validation and is done by going back to the respondents and asking for reactions and opinions (Denscombe, 2009), something we have done by asking some of the respondents to read through and comment on the empirical data part report which resulted in some minor corrections but the overall feedback was that we had captured the situation well. It was done both in follow-up interviews and by emailing the material to let the respondents read through at their own pace. To achieve transferability the description of the context of the study should be well described so others may judge if the findings are applicable to their context (Lincoln & Guba, 1986); the context of this study can be seen in the background and empirical parts of the report. For both dependability and confirmability Lincoln & Guba (1986) suggest an external audit, which was done by letting the supervisor at Support and Services read through the report which resulted in no corrections, which strengthens the dependability and confirmability of the report. In order to compensate for not recording the interviews both authors of this study was present at all interviews and took notes that were then compared. The close proximity to the respondents also meant it was easy to ask clarifications when needed. Even though some respondents have been interviewed several times there have been no pressure on us to tell a certain story, which has helped us to remain objective. Since employees with different roles have been interviewed, multiple points of view of the issues encountered have been considered which has helped with the evaluation of the information in an objective manner.
4 Empirical data
In order to be able to identify barriers is important to describe what type of work is performed and how the ERP system is used, why and by whom. To this effect, this chapter describes the data collected by interviews, documents and observations made throughout the study.

4.1 Programme descriptions
This thesis has focused on different maintenance programmes within the division Air at Saab Support and Services; the programmes vary in complexity and size and therefore demand a workflow that is flexible and scalable. The two programmes that have been studied were chosen since they are similar to each other, they were started during the same period, and are both in the post-implementation phase of the ERP system. The two programmes are both part of the Air division that was formed during the later parts of 2011 when Support and Services went through a large reorganisation which came into effect on the 1st of January 2012. The reorganisation introduced a new organisational structure built upon four newly created divisions; Air, Land, Lifecycle logistics, and MRO. The Air division was created with a matrix structure where the functions and programs created the matrix as illustrated in Figure 11. (Maintenance Manager, 2013b)

![Division Air matrix structure](image)

Figure 11. Division Air matrix structure (Maintenance Manager, 2013b, p. 6)

Each specific programme has a programme owner who is responsible for managing the programme and its customer. An issue with the current organisation is that the programme owner has limited authorisation over the different functions within the programme since each function has their own manager. It is therefore difficult to set goals since employees do not have to follow them. (Programme leader, 2013c) On the 1st of January 2014 division Air is reorganising again, going from a matrix organisation to something that looks more like a project organisation with the functions integrated and working under one programme leader. Because of how recent this new organisation is, it
has not been included in the study. To create an understanding of the situation at Saab and the usage of the ERP system a brief description of the programmes and what they do is presented.

4.1.1 Maintenance programme A (MPA)
The MPA consists of 20 lightweight helicopters which are owned and operated by the Swedish Armed Forces. The helicopters are primarily intended to be used as training vessels but they can be used in military combat, both in Sweden and abroad. (Swedish armed forces, 2006) The helicopters have been operated by the Swedish Armed Forces since 2006 and maintained with the help of an outside contractor. In 2012 Saab took over the contract and started performing maintenance on the helicopters. The contract extends over 6 years with an option to extend it up to an extra 4 years. (Programme leader, 2013b) There are two types of maintenance performed on the helicopters called line maintenance and base maintenance. Line maintenance consists of basic maintenance necessary for every-day airworthiness such as pre-flight check-ups. This is performed by the Swedish Armed Forces in order to keep the competence within that organisation for when the helicopters are deployed abroad. Base maintenance is bigger and more involving scheduled work that is done in tiers based on the number of flight hours for the helicopter such as 100 hours, 200 hours and 400 hours. Besides scheduled work, base maintenance is also performed when a problem is found in line maintenance that needs more complicated repairs. Saab mainly takes care of the base maintenance but sometimes also line maintenance when the workload on the regular workshop is too high. (Programme leader, 2013b) The MPA organisation consists of around 26 employees, around 20 of these are technicians, and is run by a programme owner.

Besides maintenance they also supply components and special parts which they deliver to the Swedish Armed Forces. Since the helicopters are owned by the Swedish Armed Forces the initial stock of spare parts are also owned by the Swedish Armed Forces, but Saab takes care of the procurement of new parts. The parts are first bought by Saab and then sold directly to the Swedish Armed Forces and entered into Saab’s ERP system as zero-cost parts, except parts not included in the initial stock that are handled as company owned parts. (Logistician B, 2013b) The external ownership of the helicopters is also why Saab has not entered them into their ERP system to track the lifetime of the components since that is done in the customer’s system. (Planner, 2013a)

4.1.2 Maintenance programme B (MPB)
The MPB is the newest helicopter addition to the Swedish Armed Forces and consists of 15 helicopters which are intended for Sweden’s ongoing participation in the international security assistance force (ISAF). The Swedish Armed Forces has a maintenance contract with the manufacturer of the helicopter who in turn uses Saab as their local subcontractor. (Workshop manager, 2013) (Sikorsky, 2012) Because of the contract Saab performs both line and base maintenance at MBP, but all logistics such as component repair and spare parts supply are handled by the Swedish Armed Forces.

4.1.3 Processes at Support and Services
The processes are described in order to paint a picture of what type of work is performed at the studied programmes. There are multiple processes within the maintenance programmes, the main maintenance processes at MPA is similar to the MPB maintenance process and they will therefore be described together; when there are differences they will be pointed out. The program leader has helped in the identification of some processes that are not formally described. They include maintenance, component repair and ordering of spare parts processes.
The maintenance process describes the maintenance of a helicopter, the general process is shown in Appendix A. It starts when the customer sends a request for maintenance to the System Admin. The maintenance is first planned by a Planner that belongs to the customer’s organisation, but at MPA the role is bought from Saab. The System Admin checks that the maintenance request is within the bounds of the contract before creating it in the ERP system. (System admin, 2013) The work order package is printed out and put in a binder which is assigned to a Check Leader that is responsible for carrying out the maintenance request with a team of technicians. A work order consists of all the different tasks that have to be done in order to complete the maintenance. The Check Leader is a senior technician and a new one is assigned for each check. A check consists of periodic inspections and maintenance. The required components are picked from the warehouse by a Warehouse Manager with the aid of a picking list from the ERP system before being delivered to the helicopter in question in the workshop. At MPB there is very limited stock so most components have to be ordered. At MPA most components are in a warehouse in the same building as where the maintenance is carried out, Logistics at MPA monitor warehouse stock levels and place orders when components dip below various reorder points. When a work order is completed the technician signs the paper and writes down what was done; this is also done electronically in the ERP system. When the maintenance is completed the Check Leader goes through the binder of signed work orders together with an expert technician called a Chief Technician for approval. After approval the maintenance order is closed in the ERP system and a Certificate of Release of Service (CRS) is printed. The CRS is handed over to the customer together with the helicopter log. At MPA separate invoices are created for the part of the work and components that is not covered by the contract (Logistician A, 2013).

Some components have to be sent away to the manufacturer for repairs when they break. If the customer discovers the broken component they send it to MPA. When the component is received it is examined by a technician to see what needs to be done and to evaluate if it has been misused. Only two technicians perform this task in order to get uniform assessments. The Logistics department send the component back to the manufacturer, whose lead time can vary greatly, for repair or to another department within Saab Support and Services called MRO. After the repair the component is returned and goes through an arrival certification process to verify that it is correct and in working order. If the component was not covered by the contract it needs to be billed and an invoice is sent to the customer.

Logistics can see from the ERP system when they need to order certain spares, either because they have reached a reorder point or that there is not enough in the warehouse to cover demand. They send out requests for quotes to predetermined suppliers by emailing spreadsheets; an order is then placed to the winning quote. Orders of larger quantities can be received in parts which are then partially invoiced to the customer after the approval process.

4.1.4 Other roles in the programmes
Since there are many different roles within the programmes we believe it is important to describe what they do in order to create some context, different employees have different needs and therefore have different usage patterns of the ERP system. Besides the roles described in the Processes chapter, there is also a Workshop Manager that oversee the operations and makes sure that employees receive the correct training, authorisation and tools so that they can complete their jobs. He is the contact person for the customer and has both weekly and monthly meetings where they plan and follow up operations. The Programme Owner is responsible for managing the programme, deal-
ing with the customer and making sure that the contract is fulfilled. The Swedish air force is the cus-
tomer and performs some of the service on the helicopters. It is the customer that owns the helicop-
ters, when Saab services the helicopters the responsibility is transferred to Saab, on completion of
service the responsibility is transferred back to the customer if they are satisfied with the work.

4.2 IFS Sherpa
Since the aim of the study is to identify barriers it is relevant to describe the ERP system and how it is
used within the studied programmes. IFS Sherpa is an ERP solution that has been developed by In-
dustrial and Financial Systems (IFS). IFS solutions are used throughout Saab and the specific variant
being used at S&S is called Sherpa which is built upon the IFS application 7.5 which was released in
2007 (IFS World, 2007). Version 8 of the ERP system has been released during 2013 and Saab plans
to migrate towards that platform, however that might be costly since Saab has done customisations
to Sherpa which would then have to be adapted to the new release (System Engineer, 2013). IFS
software has been used within Saab since the early 90s but this is the first time that an ERP solution
will be used throughout Saab. Figure 12 is a screen grab of how the interface of IFS Sherpa looks.

On the leftmost screenshot the IFS Navigator (marked with a red outline) can be seen. Here, all the
different views are accessible to the user. By default all the users see the same interface, they see all
the available views and folders. It is possible for users to customise the Navigator, but it is not cus-
tomised by default which creates an unnecessary complexity (Maintenance Manager, 2013a). The
rightmost screenshot is an illustration of how it might look when a user is accessing many different
views. The system is complex to use (Planner, 2013b) and it can be unclear how the different views
are connected (Logistician B, 2013b). Even to do simpler tasks it is sometimes necessary to use mul-
tiple views and it is considered to not be user friendly by some of its users, such as the technicians
(Maintenance Manager, 2013a). Employees that do most of their work in Sherpa, such as the system
admin at MPA, believe that it is “entirely necessary to have two screens to work with Sherpa”
(System admin, 2013b). An observation is that navigation between views is not very consistent,
sometimes there is a link to click, other times the user has to right click on the screen to get forward
in the work flow. One user who has been working with the system for over six months still finds it
confusing and difficult to use, “There are no clear flows in Sherpa, you have to jump around a bit, it is
confusing how it fits together” (Logistician B, 2013b).
4.2.1 Other software

Even though Sherpa replaced a lot of legacy systems, there are still other systems being used within the different programmes. Besides Sherpa the people in the support programmes use Unit4 Agresso, Microsoft Excel and Microsoft Project. Agresso is an application used for project management, financial and administration departments and maintenance administration and is used within the Saab group as the main financial system. It can also be used for electronic invoices, automatic reports and data retrieval and is integrated with Sherpa in multiple ways (Saab Group, 2013a). There is overlap in functionality between Agresso and Sherpa. There is also other software for functions such as payroll, training and competence monitoring.

4.2.2 Reasons for implementing Sherpa

There are multiple reasons as to why companies choose to deploy an ERP system. At Saab the reasons have mostly been long term strategic goals. At Support and Services a main reason for implementing Sherpa has been to be able to offer larger integrated solutions to its customers. Management identified that the market was changing and came to the conclusion that an ERP system was needed for Saab to be able to stay competitive, IFS Sherpa enables Saab to handle larger projects. (Head of strategy, 2013)

Since Saab had grown both organically and through acquisitions there are a lot of different legacy systems being used by thousands of users throughout the company. The implementation of IFS within Saab meant that 59 legacy systems could be replaced. Some of these systems were developed by Saab or depended on individual competences. It was also meant as a way to unify Saab by using a standard system throughout the organisation which fits well with the GMS project. Saab has a goal of continuous improvement and by implementing IFS it is believed that synergies can be achieved throughout the Saab group and also save costs. (IFS AB, 2013)

Potential strategic benefits of using Sherpa

It is apparent that the value of Sherpa has been well communicated throughout Saab since most of the employees that have been interviewed have said that they understand the value of the system and that they understand why it has been implemented; this includes managers, technicians, planners, and system admins among others. Since Sherpa is such a broad system, different types of employees use it in different ways and receive different benefits from it.

Many managers seem to have understood the value of the ERP solution that Saab has chosen to implement, the system has the potential to be very useful for them. One of the larger unrealized benefits of Sherpa is the potential to follow up programmes according to one respondent. In the helicopter programme contract which is mostly about base service for helicopters there is an option for extra sales of equipment and components, around half of the revenue for this programme comes from these types of extra sales. At the moment not all of these sales are handled within Sherpa but instead within Agresso, they are therefore difficult to follow up (Programme leader, 2013c). As it is today the MPA programme owner barely uses Sherpa but instead uses Agresso, which is more of a financial tool, because it is easier to use and takes less time since he already knows how to use it. Data entered into Sherpa is automatically transferred over to Agresso, but it does not work the other way around. Constant reorganisations have made it difficult to get relevant historical data since the data takes time to build up and become usable (Programme leader, 2013c).
When making quotes for future contracts it is important to be able to construct these using historical data. And for the quotations to be good they need to be based on historical data that is all encompassing and accurate. Therefore if data is entered into the ERP system during the life of the programme it is important that it is correct data. By understanding the real profitability of historical programmes Saab will be able to make more accurate quotations in the future. (Programme leader, 2013b)

The aircraft business is highly regulated which means that there are strict rules which needs to be followed. For example technicians need specific certificates in order to do electrical work on an aircraft. The certificates have a certain life and needs to be renewed from time to time, at the moment Sherpa does not track these certificates but it would be good if it could. (Maintenance Manager, 2013a) Another thing that is not done in Sherpa is scheduling, at the moment scheduling is either done in Excel or MS Project, since Sherpa is considered to not be flexible enough to be used (Maintenance Manager, 2013a).

4.2.3 The IFS Sherpa implementation project

By describing how the implementation was carried out it is possible to evaluate if issues that are present today are because of work that was carried out during the earlier implementation phases.

Project chartering

The implementation of IFS Sherpa at S&S began during 2009. Before the implementation started at Saab management had realized that there was, or was going to be, a need for better software solutions than the ones they were using. Since the market was moving towards larger integrated solutions management concluded that an ERP system was needed. (Head of strategy, 2013) A pre-study group was put together to determine what ERP solution would be the best fit for Saab. Saab had a prior relationship with IFS which meant that they were the favourites going in, the responsible parties had already made up their minds which resulted in the pre-study being rushed (Programme leader, 2013b). Saab has had IFS software solutions since the middle of the 90's, these solutions had been used in smaller divisions within Saab and never to the extent that the new system was meant to take on. The goal of the project was to have one coherent solution throughout Saab, instead of the multitude of legacy systems that had accumulated over the years.

Project phase

The implementation phase of the ERP project started in 2009 and went on into 2011; the system was rolled out gradually over several locations. At the Air division within Support and Services the implementation started at Tannefors and Nyköping before being rolled out at Malmen. Saab had personnel as part of the implementation teams but it was IFS that was supposed to configure Saabs processes to fit into the ERP system (Programme leader, 2013b). IFS had limited experience of the aircraft industry at the beginning of the implementation, at a later stage they brought in resources that had done a similar project for the Norwegian air force. Due to the fact that it was IFS, not Saab, that was supposed to determine how Saabs processes were supposed to look led to problems since they had limited knowledge about the aircraft industry and Saab. (Programme leader, 2013b)

Shakedown phase

At S&S the shakedown phase happened in conjunction with the start of some of the helicopter programmes, such as the MPA programme. The Air division has around 440 employees and consists of a few maintenance programmes, in order to staff the new programmes around 80 new employees had
to be recruited, and none of the new employees had any experience with IFS Sherpa which was a difficult period when all of the employees had to learn the new system (Maintenance Manager, 2013a). Out of all the people involved in the different support programmes around 10 people received formal training from IFS during this time. At the start of the programmes there were a lot of issues specifically related to the use of IFS Sherpa, some technicians even started a movement for Saab to stop using it. At that time management set an ultimatum to the technicians, either quit or stop complaining and learn how to use the ERP system. The ultimatum seemed to work since the complaints started to decline. Ultimately three technicians did quit since they had lost their desire to work since they felt Sherpa was so demanding and detracted from the actual work of performing maintenance. (Maintenance Manager, 2013a)

**Onward and upward phase**

Saab is now in the onward and upward phase of the ERP implementation where operations have stabilized.

4.2.4 Usage of IFS within Support and Services

As mentioned above different employees within S&S uses the system in different ways and to different extents. The system admin is the employee within the studied programmes who uses the ERP system to the largest extent, when preparing a maintenance order he switches between around 6-7 different views in Sherpa, this is most of his time is spent. The system admin has other tasks he performs and in total he uses around 20 different views within the ERP system (System admin, 2013b). When preparing a maintenance order the system admin creates a maintenance order within Sherpa and then adds the different work operations that need to be performed to create work orders. Each work operation has specific steps which tell the mechanic what actions to perform on the helicopter when executing the maintenance. When all the work orders are added the ERP system has a list of required material that the system admin goes through and checks that material is not double booked, sometimes two separate work orders requires the same component to be changed. When the System admin is content that the material for all the work orders are correct he then goes through the work orders again and reserves the material. At this point logistics can see that there is a demand for certain components or spare parts. When the maintenance plan is completed it has to be printed, this is done just before the system admin goes home since it renders his computer unusable while it is printing and takes almost an hour. After the check has been completed the system admin also goes through the completed work orders before closing the customer order to see that the hours assigned to each work order is reasonable in case any technician forgot to sign in or out. What is considered reasonable is presently determined by his experience but enough data is being built up that they have started to use business intelligence software called Qlickview to assess the average hours. It was planned that the system admin should also create the invoices for the hours worked but this is currently done by the program leader since the system admin thought Sherpa was too complex and hard to use when creating invoices. (System admin, 2013b)

The planner’s use of Sherpa is limited. A couple of times per day he goes into the system and looks for work orders that have completed, he then takes that information and manually enters it into Didas which is the Swedish Armed Forces information system. These systems are on separate computers so the information currently has to be read on one system by the planner and then manually entered into the other, when a work order is entered into Didas it receives a unique number which is then has to be entered back into Sherpa in order to connect them with each other.
The logistics function uses Sherpa extensively, the warehouse administrator receives a notification in Sherpa when he needs to pick material from the warehouse. He gets a pick-list which comes from a work order, he then has to find each item and manually enters into the system that he has picked them up. When the list has been taken care of the components are taken out to the helicopter for which they are intended. The rest of the logistics team deals with purchasing of components, they can see in Sherpa when there is a shortage for different components and they can then place new orders for the components. Orders can be made in Sherpa and later exported into a spreadsheet, it is the file that is sent to the different suppliers via e-mail. Saab’s ERP system has the possibility to integrate with outside suppliers but this is a feature that is not utilised which is why they need to use spreadsheets, if they are pressed for time they call the suppliers. A few of the components can be bought from within Saab, if that is the case the orders can be completely handled from within Sherpa. This means that they don’t have to ask for quotes and the whole process is faster, around 4 percent of the value of components can be ordered using Sherpa from within Saab. There are issues with this however, since there are no standard routines for part entry it can be difficult to find component in Sherpa since different people have different routines for how to add the info into Sherpa. They also used to be able to see stock levels for different internal warehouses but that is not possible anymore due to restrictive permissions (Programme leader, 2013c). When orders are received logistics creates an invoice which they then send to the Swedish Armed Forces. Orders are sometimes divided up and shipped on different occasions, this means that logistics can send out multiple invoices for one order. These invoices are not connected to any work orders and they are sent out separately which means that the customer can receive multiple and separate invoices for one helicopter service. Sometimes the value of the received parts is not entered correctly which causes the new parts to be valued at zero. When there is already identical parts on stock their average value are affected without warning in the system. (Maintenance Manager, 2013a) The different components are generally in Sherpa and lead times are available if they have been added by logistics. The MPA contract specifies 19 different components that Saab has to be able to deliver within a predetermined time period. A problem that has occurred is that the customer has been billed twice for the same material which was caused by the invoices being sent out by different people from different parts of the organisation. (System Engineer, 2013)

The check leaders use Sherpa to a larger extent than the rest of the technicians, a majority of their time are spent within the system. The technicians receive printed out work orders which contains certain tasks they are supposed to perform on a helicopter. When a task is complete they need to fill out the printed out work order and then they have to log into Sherpa and enter the same information again into the system, which means that the same data has to be entered twice. If a component is missing or if they find a component in the helicopter that needs to be replaced which was not part of the maintenance order they can enter it into the system themselves.

4.2.5 Training and education
Most people who use Sherpa in their work have received limited or no kind of formal training; instead they have learned how to use it by employing a method of trial and error and mutual adjustment. If employees have specific issues with Sherpa there is an IFS Helpdesk to which they can either call or send an email in order to get help. Some employees have even built their own informal communication channels with colleagues in similar roles whom they can ask for help regarding Sherpa (System admin, 2013b).
At one place which consisted of a lot of older technicians who were closer to retirement age a decision was made not to try to educate them. They were let to continue to work as they had before and instead an assistant was hired whose sole purpose was to enter in all the data into Sherpa for them. (Maintenance Manager, 2013a) At MPB they have created simple written routines that the technicians can look at when learning how to use the Sherpa system (Workshop manager, 2013).

The training that has been carried out in relation to IFS was at the start of the programme. Since most of the people involved in this phase had limited experience with using Sherpa they had to learn how to use it during this time. There were around nine people who were part of this preparatory group. For example the system admin took online classes and used simulated training cases in order to learn how to use the system. He also had to insert all the underlying base data about the helicopters into the system, data such as part numbers and what steps each work orders consists of. He found that this process was very helpful as it helped him create a good understanding of how the system was built up and how it works. (System admin, 2013b)

The planner is currently in the process of receiving IFS-related education pertaining to CAMO (continuing airworthiness management organisation). The perceived benefit for him is currently limited since he doesn’t use Sherpa to carry out the planning, instead he uses the Swedish Armed Forces software solution Didas to perform the planning (Planner, 2013b).

There are IFS Sherpa groups, called user-groups, which meet around six times per year where employees from Saab can voice their concerns and ideas for improvements. The groups are separated by function so logistics, human resources and vehicle management have their own separate groups. The discussions in these meetings are brought up to a council within Saab who takes it up with a change board where changes are either approved or denied. Changes that are accepted and implemented are not really communicated back to the users. An IFS consultant used to come and tell the user about new updates and features but not anymore (System admin, 2013b).

4.3 The management system GMS
Saab has developed a management control system called Global Management System (GMS) which is an effort to create one Saab by standardizing the way people work by using a common language and creating universal approaches, methods & tools and templates. Saab is aware that this will not materialize overnight but is an on-going project with the aim that it will be accomplished through perseverance and clarity (Saab group, 2013e).

GMS should define the most cost effective ways of working and to make sure all employees are familiar with how they should work. The focus of GMS is to create value for the end customer and it consists of five different categories (Saab group, 2013e):

1. WHY - policies. It consists of Saabs policies and values within different areas. The policies are written on a general level and are concise.
2. WHAT - requirements. These documents specify what action is to be taken to satisfy an internal or external requirement. If something is ambiguous the documentation is used to clarify Saabs interpretation of the stakeholder’s requirements and how they should be implemented in GMS.
3. **HOW - processes.** It consists of documents explaining which processes and methods that should be used when an operation is carried out. This is done with process diagrams by establishing graphical descriptions of workflows.

4. **WHO - organisation and roles.** Documentation lays out organisational charts and describes responsibility, delegation, authority, collaboration, etc. The WHO document is also used for role description.

5. **INF - Instructions, methods, handbooks.** It is to be used to describe activities where more detailed information is required or to supplement a process stage, e.g. quick guides, templates, etc.

Saab has a lot of requirements on how they operate such as RML, ISO9001, ISO14001, EN9100, EASA, profitability and customer requirements among others. These requirements are interpreted and addressed in Saab's processes and by using these processes Saab can then ensure that the requirements are followed. By creating a uniform Saab which has similar ways of working and uses similar tools the hope is that it will create other benefits. By developing these types of best practices Saab wanted to create a flexible organisation where employees can jump between programs due to the standardized ways of working. (Saab group, 2013e)

According to our observations and to respondents GMS is not well used within Support and Services, this is partly because the part of GMS that handles execution of projects is not suited for Support and Service type programmes that spans several years of doing similar work. It is used partly by the programme owner who mainly uses GMS in order to know what documents to produce and templates for them. (Programme leader, 2013c) (Maintenance Manager, 2013a)

### 4.4 Management at Support and Services

The management control of the programs included in this study is described within the context of the frameworks by Ferreira & Otley and Malmi & Brown presented in the Frame of reference chapter.

Saab’s vision is that “*It is a human right to feel safe*” and the mission is “*to make people safe by pushing intellectual and technological boundaries*” (Saab group, 2012), but the vision of the business area Support and Services is “*[...] to be the leading provider of integrated support solutions*” (Saab Support and Services, 2010). According to the head of strategy of Support and Services they chose not to have a pronounced mission statement, but their overall strategy is to offer integrated solutions in order to take on some of the risk from the customer and in that way justify a higher price. A key to this strategy is that Saab is such a big company that they can offer more and take on more risk than smaller competitors can (Head of strategy, 2013). In the case of the SK60 contract Saab is well suited to maintain and upgrade the airplanes since they designed and built them. Saab also has some special certifications and permits that are required to have in order to work on aircrafts. In helicopter maintenance, they offer a set price for maintenance per flight hour which takes some of the risk from the customer and forces Saab to think about their costs in a new way. Instead of doing as much work as possible, it is more profitable to do as little as possible (Head of Support and Services, 2013). This strategy is not observed to be communicated in a way that affects people’s actions even though they seem to be aware that costs savings are necessary. Management have taken steps however, such as layoffs of some personnel. Other values have different influences, high quality values are coming from the strict rules governing aircraft maintenance and the intrinsic knowledge that
faulty aircrafts can cost human lives. None of the respondents could account for what the vision and mission of Saab or Support and Services is.

The programmes looked at in this study are all structured as matrix organisations with the programmes and their owners on the horizontal axle and the various functions on the vertical as seen in Figure 11. Except for management, the functions are split up with the people within the functions working at separate locations according to their programme. The technicians, mechanics, administrators and logistics personnel of one programme are working together in a building separate from another programme. The people working in one function mostly works on one programme and specialises in that particular work, there are some resource sharing such as technicians working on different helicopters but the amount is limited. There are various reasons for this such as differences in contracts where the logistics function is mostly managed by the customer in one program and the fact that different helicopters differs in how they are serviced and what parts they need. The managers of each programme are located in another building a short drive from where the military helicopters are serviced, together with other support staff such as controllers and strategy development.

In one of the programmes the program leader identifies several different business processes such as scheduled maintenance and sales of spare parts, however the logistics department is unaware of these processes and are instead following their own processes of procurement and sending parts out for repair.

Since Saab does not own the helicopters being serviced in some of the programmes they must transfer the information of what is done on them to the customer’s resource systems and this is not done automatically by connecting the two systems since the customer is military and does not allow such connections. This produces some extra work where an employee at Saab has to oversee the system in Saab to see the finished work orders and enter this in manually in the customer’s system. The access to the customer’s resource system is also why they have not entered all the individual helicopters into Sherpa since it would be duplicated work. (Planner, 2013b)

Saab is very dependent on the manufacturer of the helicopters to provide new spare parts and overhaul of broken components. This has become a problem with one of the manufacturers since their lead times are very long and varied which affects Saab’s ability to plan the services when the parts that needs to be replaced is unknown beforehand or when components needs to be removed and sent in for repair. As a result parts are sometimes missing when the helicopter is ready to go out and in those cases they sometimes move parts from one helicopter to another.

The programme leaders have profit as a financial goal that is measured and followed up monthly and the customers of the programmes have their own requirements in the form of key performance indicators (KPI). There are some informal measures such as time to finish a check on a helicopter that the customer agrees on with the planner when a service is scheduled and this is based on previous experience calculated in a spreadsheet. There are no measures put on the line organisation from the programmes point of view because of the matrix organisation that affords limited formal control to the program leader, that responsibility instead falls on the line managers (Programme leader, 2013c). The performance measures such as the time to perform a check is set for the whole group and set realistically to be achievable (Planner, 2013b). The financial measures put on programme leaders are individual and can make resource sharing more difficult since an internal price needs to
be agreed upon and the right cost centre charged to not affect the profit of the wrong programme. This has led to inefficiencies where a programme can charge an external customer a higher price for a service than another programme within Saab has the budget for, resulting in that program building its own duplicated competence instead. (Maintenance Manager, 2013b) Targets within the programmes have not been implemented yet since they are still too new for meaningful and accurate targets (Programme leader, 2013c).

Everyone at Saab have Individual Performance Management (IPM) meetings once a year with their closest supervisor to evaluate individual goals, workload and values among other things. This is done with a standardised form with a mix of subjective and objective measures. In interviews respondents claim they have only fuzzy or no goals. There is no financial reward system at Support and Services other than potentially increase in salary based on the IPM evaluation. Informally, persons that stand out in a positive way can be given more responsibilities and recognition. (Programme leader, 2013c)

Besides the ERP system Sherpa there are other information systems in use, Agresso being the biggest one for financial data. There are strict rules that govern how work on aircrafts are documented so every work order are filled in and signed both in Sherpa and on paper. The papers are then saved in binders. The printed papers are also used to delegate work among the technicians by the check leader and is used a physical evidence of what work is delegated and to whom (System admin, 2013a). For informal communication the personnel from the different line organisations are seated in separate offices for each program but can use instant message software for quick communication if needed. In one of the programmes, the planner and administrator are seated in the same room while the logistics personnel are located in another room separated by the workshop and a locked door, the programme leader is located in another building a few minutes away.

Sherpa is mostly used as an administrative tool and less for information purposes by management. Some users claim that Sherpa is not well suited for their work and it has been observed that they therefore inputs information in a way that is better suited for them but not well connected to the information flow of the overall process, and thus makes the available information unreliable and incomplete. One example of this is making invoices that are not connected to any maintenance order which excludes them from that order’s overview.

Some information such as the time it takes to perform a work order is read from Sherpa by separate software called Qlickview and then used to plan future work orders. This information is based on what the technicians enters when they sign off on a work order and is monitored by the system administrator to catch incongruous outliers such as too many or too few work hours. (System admin, 2013a) One programme uses a helicopter maintenance schedule that is done together with the customer and updated six to seven times a year. It is used to evenly spread the flight hours of the helicopters and to make sure there is free capacity in the workshop when a helicopter needs to be scheduled for a check and is made with the historic data in mind to plan how long a check will take and updated if one helicopter needs to be scheduled earlier for some reason. The schedule is done in a spreadsheet and updated by hand; it is also put up on a white board for added visibility in the office of the planner and administrator. (Planner, 2013a)
5 Analysis

In order to identify the underlying barriers to beneficial use we will analyse several issues that have been uncovered during this study. The empirical findings have led to the identification of a number of issues and situations where the use of Sherpa can be considered to be problematic which are: invoicing issues, mismatch between Sherpa and business processes, inaccurate or no data, poor overview of data, poor knowledge of key features, and time consuming. This analysis will look at these issues and try to identify mutual barriers which might help to explain the identified issues. The issues are not presented in any particular order of severity.

5.1 Invoicing issues

As part of the decentralised ambition within Support and Services, invoices are sent out from different parts of the organisation which has led to some issues. The biggest issue is the bad overview of the invoices such as what has been invoiced, when, and how much; another issue is that hours and material are billed on separate invoices. One reason for these problems is the decentralised responsibility for who should send out the invoices combined with lack of clear routines for how this should be done. The decentralised responsibility is in line with what Shang & Seddon (2000) writes about empowerment and giving employees more responsibility; and Hammer & Champy (1993) that lists decentralisation of decision making as an organisational benefit of IT-systems. However as Jones et al (2006) describes in their knowledge sharing framework, the success of decentralisation is dependent on knowledge sharing which in the case of Support and Services would be implemented by using Sherpa. Since the invoices are not always connected to the customer and maintenance orders in a way that makes them visible, it is impossible to get a clear overview using Sherpa resulting in usage of legacy software and workarounds with spreadsheets. Since there is hardly any follow-up on management level of the data entered there is less incentive to enter data on the operative level, a situation that causes a downward spiral.

No formal business processes were encountered during this study, even though one program leader had such ambitions of how the programme was supposed to run. This can be attributed to the matrix organisation structure of each program that is poorly suited for process oriented organisations, the rushed implementation of Sherpa within the two maintenance programmes, and the poor fit of GMS to Support and Services’ kind of work. It has been observed that the matrix structure at Saab has caused issues with priorities between managers, which is a common issue with the organisational form according to Ford & Randolph (1992). This means that it has been difficult to optimise the work around the process since the functional managers have tried to optimise around the functions instead. It is because the employees generally follows the directives from their functional manager and not the programme leader. The matrix organisation together with the separate offices of the functions has the risk of creating small clans (Malmi & Brown, 2008) and isolation (Jones, et al., 2006). The work is done in each function yet not in a way that fits together with the rest of the process. Sherpa and its routines being implemented by IFS themselves caused some friction in the workflow since the situation at Support and Services was new to them. This can be seen as the inventory is owned by the customer the new material is sometimes entered as zero-value which causes issues with invoicing and can cause issues with inventory costs.

The lack of formal processes and the matrix organisation also causes problems with transparency within the programmes. This is something that should be done in what Mintzberg (1989) calls the
Technostructure. When one person does not know what data the persons in the following process needs there is less motivation to enter more than needed. This lack of transparency in the process resulted in double invoicing issues in the past, as the rest of the organisation did not know about the sent invoice, the customer were sent invoices from several divisions. The processes followed today at the functions are similar to before the introduction of Sherpa, using the older methods in the new system that was designed for a slightly different way of working.

5.2 Mismatch between Sherpa and business processes

One of the reasons for implementing one ERP system throughout Saab was to standardise processes with the help of GMS, but since Saab does such a varied amount of work most of the processes have not yet been standardised. Instead GMS tries to cover bigger processes, such as winning business. When IFS came to Saab to map out the different processes the MPA and MPB programmes had not yet started which can be a reason for the bad fit with Sherpa. GMS was also in its start-up phase which means that Saab had just started the work to standardise their processes. That together with the fact that it was IFS that came up with the processes that Saab was supposed to use meant that the result was not a perfect fit. Even today the work with GMS has continued but there are still few processes that are covered in it. Further benefits of ERP systems is that it makes it easier to efficiently and effectively merge new businesses into the organisation’s standard business practices (Shang & Seddon, 2000), however since the standardisation of business practices at Saab is currently lacking, this is not a benefit that has been achieved yet. Great benefits can be had from formalising and breaking down processes, if process maps are made, employees whom are part of the process can get a better understanding on how their part in the process ultimately creates value for the customer and how their work relates to other people in the process. It further makes it possible for management to break down their overall goals into more actionable sub-process specific ones. (Rentzhog, 1998) According to Davenport (2000) and Kiriwandiya et al. (2013), in order to shorten the time it takes to achieve benefits they have to be measured and people have to be held accountable for them. The only things that are measured and followed up that have been observed in the studied programmes are financial KPI’s such as budget goals.

An issue that has been observed in the studied programmes is that the processes that were developed by IFS don’t fit well with how work is actually carried out in the studied programmes. Sherpa is a large system and it forces employees to work a certain way when using it which has also resulted in that customisations have been done in order for it to work with the processes in the studied programmes. When implementing ERP systems people often have to change the way they work for it to fit in the new system (Botta-Genouzal & Millet, 2006). If people are not willing to change there will be resistance. Kiriwandiya et al. (2013) state that the less customisation that is done the more likely it is that the implementation will be a success. The customisations will cause issues in the future if they want to upgrade to a newer version of the ERP system since it will be more costly. Instead of adapting to the system and its way of working it seems that people have adapted the system to how they have worked in the past, which creates issues. This is probably because either people don’t know enough about Sherpa to do it correctly, or that they don’t want to change how they work. The result is that people have created ad-hoc processes within Sherpa, but since Sherpa does not fit with their processes they have had to rely on legacy programs such as Excel to fill the gap that occurs. ERP systems generally have best practices built into their processes (Light, 2005), but if the processes are not followed neither are the best practices which is a lost opportunity. ERP systems
are also supposed to enable the employees to be able to put more concentration on core work (Shang & Seddon, 2000), but since the system still takes considerable time to use this benefit has generally not yet been realised.

Since Sherpa forces a certain way of working and the processes have changed with the introduction there has been resistance to it, for example with the technicians. When changes are made with a top-down approach changes can be made quickly but they are also met with more resistance (Nahavandi, 2009). With resistance people are less likely to accept the changes, which raise the risk of failure of a project.

A benefit of modern IT according to Hammer and Champy (1993) is that a generalist can do the job of an expert; however this has not been the case at Saab. A driver for implementing Sherpa within Saab was that older legacy systems sometimes relied on power users, the ERP system was meant to minimize that problem. However, our observations have shown that it has not panned out that way and instead there are still key employees which are relied on in everyday operations. An example of this are the system admins as MPA and MPB, they are the only ones who can create maintenance packages within Sherpa which is a risk if they were to get sick, or even worse quit.

An issue that has been identified with the IFS user groups is that they are built up on functions: Logistics have their own user group and System admins theirs, et cetera. This means that issues and problems discussed in these groups only pertain to that specific function. When new functions are added to the ERP system it is difficult to know how they will affect other functions since they had no say in the process. As stated previously customisation of ERP systems can bring future issues and it is therefore better, if possible, to solve these issues by for example adapting the work practices instead. This would be easier if people from multiple functions were present since they could help each other and together finds a solution with works for all of them.

Another reason for why the processes in Sherpa have a bad fit with the MPA and MPB programmes is because of their contracts with the Swedish armed forces. They are not free to adapt their workflow but instead they must work within the boundaries of the contract and the regulation of the aircraft industry. For example, while Sherpa might support a paperless support process Saab has regulations which forces them to print out Work Orders and have technicians sign them by hand. Another issue at MPA is that they don’t own the helicopters and only perform base maintenance. Saab has to manually interface with the Swedish armed forces maintenance system as it is not possible for the two systems talk to each other automatically due to a number of reasons, one of them being restrictions. At other programmes, such as SK60, where Saab owns a larger part of the process they experience more of the benefits from Sherpa since it can be used more as intended.

5.3 Inaccurate or no data
It is important that the quality of the data in the system is high in order for users to be able to trust it, and if users lack the trust, they might be hesitant to use the system, which creates a negative spiral. There are different ways to get employees to use the system according to Mintzberg’s (1989) coordination mechanisms, such as direct supervision, standardisation of work, skills or output by utilising KPIs. A condition of using the system is that it fits the work that should be done which is dependent on the success of ERP implementation. Out of the implementation success factors brought up by Davenport et al (2004), only the first two have been observed; *Invest effort to get critical mass*
of implementation and Managing ES as an ongoing project. Investing in getting a critical mass is done by implementing ERP from IFS throughout Saab. Sherpa is considered an on-going program within Support and Services by having user-groups and the usage and adoption of Sherpa is something that is being worked on, in part by this thesis. The two factors that have not been observed are Prioritize benefits and create an action plan to achieve them and Manage and measure benefits (Davenport, et al., 2004).

It was observed that data was sometimes either entered inaccurately or not at all. The data was not intentionally entered inaccurate, but it was a consequence of how Sherpa is used. One example is the materiel list for every work operation that is done by one person. Because the list can contain duplicates the system admin has to manually scan through all the lists and add the materiel to the order. This cuts down the potential for automation where all the materiel needed could be added with each work operation automatically which is one of the operational benefits or ERP systems mentioned by Shang & Seddon (2000). Deficiencies in the materiel data are continually corrected but the goal does not seem to be higher degree of automation but as a way of knowledge transfer. The same manual entry is true for the lead times of parts by the logistics department. This data is not connected to the creation of the maintenance package where long-lead items have to be ordered in time. Instead the system administrator needs to keep in mind what items are long-lead and what work operations they are needed for. Instead of entering the lead times manually they could be imported automatically by integrating Sherpa with the suppliers’ ERP systems, as part of the strategic benefit build external linkage mentioned by Shang & Seddon (2000) that would reduce manual work and increase accuracy of the data. Real-time data was also the top reason for ERP implementations Spathis & Constantinides (2003) found in their study.

When newly received parts are entered into Sherpa they are sometimes entered as zero value on purpose, and sometimes by accident which together with what is already in stock brings the average value of those component down without warning. We believe that Sherpa should be able to warn about such situations where data is entered, and where there is no warning system there should be a routine in place to catch mistakes. Another area of data entry where errors are somewhat common is the number of hours worked on a work order. Currently this is controlled by the system admin that goes through the work orders and corrects the errors. This is again done by experience since Sherpa does not warn about abnormalities which causes a risk of missing some errors, but the recent introduction of using Qlickview to extract the hours from Sherpa can make it easier to see what a normal interval of hours for each work operation is. This could be used for knowledge transfer purposes where slower employees are grouped with faster ones to learn how they are working. This is in line with the managerial benefits mentioned by Shang & Seddon (2000) and to use the ERP system more as a consultant than an administrative assistant (Askenäs & Westelius, 2003). It is an opportunity for benchmarking to be able to evaluate changes made to training, work routines or others, and to compare with other internal or external organisations (Becker, et al., 2003). Knowing how long time work operations take with adequate certainty is also helpful when planning future maintenance orders.

Scheduling today is not done in Sherpa but in spreadsheets and other software partly because the personnel are not entered into Sherpa as resources. This means the information is not available at the planning stage where the previously discussed efficiency of the workers could be utilised to make a more effective schedule. As Shang & Seddon (2000) notes, better resource management and
better decision making are benefits that can be expected of an ERP system. The status of certifications and education could also be tracked and used in scheduling if the data were available, which as mentioned has not been realised in Saab yet.

The planning of the helicopter maintenance is done for each year together with the customer in a spreadsheet and copied to a whiteboard. This is what Malmi & Brown (2008) refers to as action planning and is part of Ferreira & Otley’s (2009) third question which is discussed in section 2.3.4 Performance management system framework. According to Ferreira & Otley (2009), it is important that strategies and plans are communicated throughout the organisation to make people aware of how their actions contribute. While the plan is visible on the whiteboard, the master copy is the spreadsheet, which is not as visible to everyone as it could be in the ERP system. Furthermore the planning data is not available to other parts of the ERP system such as forecast or automatic benchmarking.

One of the main benefits of IT-systems according to Hammer & Champy (1993) is that information can appear simultaneously in many places by using a central database, yet at places in Support and Services the same information is entered up to three times in different places, on paper and both Sherpa and the customer’s information system. This is both because of the workflow used and external factors such as laws and customer unwillingness to interconnect the two systems. This multiple entering of the same data means there is a risk of clerical errors to appear were the different copies are contradictory and no easy way of knowing which one is correct.

As mentioned in the previous section about invoicing, invoices are not always connected to the proper maintenance order which excludes them from any overview. There are several reasons for this; one is the complicated and complex interface of Sherpa that makes it hard to approach; another reason is the matrix organisation where logistics employees are not part of the de facto maintenance process but work more isolated with their own, local processes. The goals that are met by this function are not aligned with the programme goals so traceability and compilation of expenditures are of less importance to them.

A post implementation success factor mentioned by Kiriwandiya et al (2013) is top management support, which requires that top management show that they believe in the system by using it themselves when appropriate. The program owners in Support and Services however make only limited use of Sherpa and instead still use legacy software for project planning and monitoring. This limited usage lessens the motivation to use it in other parts of the organisation when there is no pressure from management to learn and use it. The matrix organisation structure could be responsible for that since program owners lack the formal authority to affect the line organisation’s behaviour (Ford & Randolph, 1992), though Malmi & Brown (2008) separates between organisational structure and governance structure. Authority could be handed over by formal contracts or informally by getting the programme organisation to subscribe to a common vision (Senge, 2006 cited in Nahavandi, 2009).

5.4 Poor overview of data

Benefits that ERP system brings with them is better resource management and that data can be used for improved decision making (Shang & Seddon, 2000), these benefits have not been observed at the studied programmes. Issues that exist are that the programmes are not managed within Sherpa, in-
stead the programme manager uses a combination of Agresso and spreadsheets to co-ordinate things, which helps to create a bad overview. This sets a bad precedence for the other employees within the programmes, as stated by Nahavandi (2009), for change to happen it is important for management to lead by example; if it is not done it undermines the change that Saab is trying to achieve. There has also been little external pressure on the programme leaders to use the ERP system to a larger extent which means there is less motivation for the behaviour to change, in part because there is no common vision of how Sherpa should be used. If the program leaders had received more training before the start of the project they would have known how to structure the programme in Sherpa and what was needed by the other employees. Here the issue of the matrix structure comes in play again, since the employees in the programme have separate managers from within their functions they don’t listen and follow what the programme leader says, it is therefore difficult to create a programme culture where the employees wants to strive to a common goal (Ford & Randolph, 1992).

An issue that has been brought up by many of the respondents is that Sherpa is not user friendly and is difficult to use. This means that it takes time to perform tasks in Sherpa, for example the Check leaders spend most of their time in Sherpa, time that might not be value adding. We believe that this results in that people try to avoid Sherpa to some extent. We have both observed and been told by respondents that Sherpa’s interface is complex, how different views are structured in folders is not entirely clear and there is no logical flow between views, which makes it difficult to understand the underlying process (Logistician B, 2013b). The different views are not ordered alphabetically which also causes unnecessary complexity.

Since there are no formalised routines within the programmes people perform tasks in different ways. An issue that has been brought up previously is that invoices for spare parts are not connected to the maintenance order, this means that there is no way for managers to in Sherpa see what invoices have been sent out and which ones have been paid et cetera. This has been solved by having a spreadsheet with all the invoices, which is then maintained manually. We have been told that Sherpa is capable of this but the issue is that employees lack the Sherpa specific knowledge of how to do it. When the ERP system is not used as intended the potential benefits of the system are not achieved.

Sherpa has the capability to check warehouse levels and place orders from within Saab and logistics at MPA were able to do that for a while. This was since one of the people had gotten too keep permissions in Sherpa from their previous employment, this mistake was later fixed and now they don’t have that possibility anymore which is as a step backwards in usability and capability. We believe that permissions should be given out more freely as there is a potential for benefits there.

One large benefit that was identified was that data from Sherpa could be used in order to make better quotes on future maintenance contracts. But for the data to be valuable it has to be accessible, today it is not possible to see the profitability of a programme in Sherpa since some of the sales are handled in unconnected legacy systems. Employees keep using the old legacy systems in part because they don’t know how to use Sherpa well enough. Since data is spread out over several systems it also makes it difficult for effective benchmarking to take place. This means that comparisons, other than budgetary, between programmes cannot be done. Since Saab has a goal to become One Saab it is something that we believe should be done, by measuring and managing benefits it can sig-
nificantly shorten time to achieve them (Davenport, et al., 2004). An ERP system enables manage-
ment to use cybernetic controls (Malmi & Brown, 2008) as part of the management control system,
this has not been done at the studied programmes. For this to be useful, the data has to be both in
the system and be reliable.

5.5 Poor knowledge of key features
Sherpa is comprehensive in its abilities and used for many purposes but it is hard for users in Sup-
port and Services to know how to access its capabilities, users do not know what Sherpa can do or
how to use some key features. This is in part because there is limited introductory training for new
users of how to use it; at one programme they have however made written routines on their own ini-
tiative for technicians, but they are the group that uses Sherpa the least. For other users there are
no routines and only basic online training, this could be because formal processes are missing so no
routines can be made. The lack of training is lessened by being able to ask co-workers for help, how-
ever at Support and Services the users sit in small groups in separate offices which makes the friction
of both explicit and tacit knowledge transfer higher, it would require moving to another room in or-
der to talk to colleagues. This hinders knowledge sharing since tacit knowledge transfer is dependent
on socialisation, observation and verbal communication (Polanyi, 1966). The way the offices are or-
ganised therefore makes open communication harder, which is one important aspect of a learning
organisation according to Senge (2006 cited in Nahavandi, 2009). Knowledge transfer also happens
in user-groups where new feature requests are discussed, but there are different user-groups de-
pending on function so there is no inter-function first-hand knowledge transfer made possible by
those.

New features and fixes used to be announced by a representative from IFS which gave the oppor-
tunity to ask questions but this no longer is the case. If users are not informed about changes in the
system they are not likely to find out about and use them.

Another part of the problem is that the interface is complex and confusing, making the discoverabil-
ity of features low. As one user said, the interface lacks a logical flow of activities, which results in
users having to learn what views to use and how to get there instead of being able to deduce it from
the interface. With users working with specialised functions the interface could be customised for
that function but this is not done. Instead, all users view all the different views, which creates com-
plexity and makes it hard to find what the user is looking for. A later version of Sherpa has imple-
mented a search functionality for finding views but that version has to receive the same customisa-
tions that has been made on the current version before an upgrade is possible.

Some key features are not implemented for external reasons, having to enter the data back to the
customer’s information system is mandated by the customer’s strict regulations and printing work
orders on paper is governed by rules of avionic service. The possibility to view inventory status with-
in all of Saab is hindered by restrictive permissions within Saab, not Support and Services.

The implementation of an ERP system is a big project and it could have been hindered at some pro-
grams at Support and Services since they were starting at the same time as the implementation of
Sherpa went live. With two big projects starting at the same time the implementation of the new
ERP system may not have had the same priority as the start-up of a new maintenance programme.
Therefore both the project and shakedown phases of the ERP implementation had to stand back while the programmes got up and running.

5.6 Time consuming

ERP systems are, according to Shang & Seddon (2000), able to increase the level of automation and save time. Some employees, such as System admins, have seen dramatic improvements and are now happy with the new ERP system. The technicians on the other hand have resisted the change and are the employees that receive the least amounts of benefits from the new ERP system. It has also been them that have put up the most resistance towards the change which was dealt with by coercion, the technicians were told that they would lose their jobs if they didn’t comply, it was effective but, as brought up by Kotter & Schlesinger (1979), is only effective in the short run and can leave people angry and with low morale. It has been observed that technicians generally only have bad things to say about Sherpa as they feel that it hinders their work more than it helps. Since the technicians is the majority of the employees and part of Mintzberg’s (1989) operating core in the programmes it is important to keep them happy. We believe that the Unfreezing and Refreezing steps were not given enough attention and that it might be a reason for the resistance (Lewin, 1951). Even with well-planned change there will always be some resistance to it, an issue here was that the resistance was not dealt with early enough and therefore it had to be handled with a relatively drastic measure in coercion. To manage resistance it is important to in the unfreezing stage communicate the need for change, in the refreezing step it is important to keep reinforcing the employees by training or using relevant reward systems to encourage the employees (Nahavandi, 2009). When the changes are made with a top-down it can be meet with more resistance and communication therefore becomes even more important. There are measures which could be implemented to improve the usability of the system for the technicians, one of these could be to introduce a barcode scanner, this would save multiple clicks in the system which would make it easier to use and reduce the risk for potential errors. When they want to bring up the work orders on the computer they have to navigate to the correct view and then enter the work order code manually which takes unnecessary time away from actual maintenance. A barcode scanner could also be introduced in the warehouse, today when parts are received or picked they have to be entered by hand which takes time. If it would be possible to just scan barcodes and that the data would automatically be updated in Sherpa it would be very beneficial. There is also a new version of the ERP system available, at the moment there are no established plans as to when the currently used platform can be upgraded, and this is because of the customisations that Saab has done to the current ERP system.

Even with employees that have managed to experience benefits from using the system still rely heavily on experience which we see as an issue. An ERP system has the potential to increase automation (Shang & Seddon, 2000), but many of these tasks are still done manually and rely on experience to perform them. Examples of tasks that could be automated is automatic order point if warehouse levels dips below certain points or that employees would get notified if they forget to clock out (if the time spent on a work-order is outside of an acceptable range). If tasks could be automated it would reduce costs and increase usability, it could also mean that it would not be necessary to rely on key employees who have the competence that is necessary to perform these tasks today. A reason for this is there is that there is not a knowledge sharing culture, it is not because employees do not want to, but rather that at the moment there are no good tools to help them share their knowledge with others. Since employees work at their respective programmes there is no formal
way for knowledge transfer between them, some employees have created informal networks but these take time to create. Even if these networks works for the people who have them, the knowledge shared through them is not made available to other employees, as it would be in for example a discussion online forum. The employees within the programme seem to have a high workload which means that there is little time to be put on knowledge management. There needs to be ways so that employees can share both tacit and explicit knowledge. Explicit knowledge can be shared by writing it down or through communication, tacit knowledge however is better shared through socialisation, observation or even apprenticeship. (Bartol & Srivastava, 2002) Even within the programmes, there is limited knowledge sharing, because of the hierarchal structures and since separate functions have separate goals, there is less incentive to work together (Al-Alawi, et al., 2007). This behaviour also causes local experts to be relied on. However, with the new reorganisation that specific issue will probably be less prolific since there will be fewer boundaries and that common goals can be set by one manager. Another boundary that has been identified is that people from different functions have separate offices, since communication is important for knowledge sharing to occur it is desirable to have offices that allow greater interaction and communication between employees (Al-Alawi, et al., 2007). If Saab wants to become more process oriented there needs to be better knowledge sharing, both within and between programmes, it will also help in surfacing issues and make the culture at Saab move towards that of a learning organisation.

A reason for the ERP system being time consuming is that there are no formalised processes and there is no natural flow in Sherpa’s interface on how to perform tasks. This means that people have created their own work flows, which might not always be optimal. The workflows also differ between employees which mean that tasks are performed differently. An example of this is part entry where there is no standard way to enter data for new components or spare parts which also result in that it gets more difficult to find them in the system. If people would have received more training they would know what to do and why they would need to do it. If a person is not aware that they are doing something wrong they will not change their behaviour. By formalizing the processes it will lead to a higher flow efficiency within the organisation which fits with Saabs goal of reducing costs (Rummler & Brache, 1995 cited in Nilsson, 2003) (Modig & Åhlström, 2012). Handovers between people or functions can lead to loss of information and uncertainty in responsibility. By formalizing processes and identifying where handovers take place it is possible to minimize the negative effect of them according to Rentzhog (1998).

One thing that has been observed is the user-group meetings, whose purpose is to improve Sherpa, but they happen only a few times a year and the improvements from them are barely communicated out to the organisation. According to Nahavandi (2009) it is important for morale to celebrate success and that is not something that has been observed.

5.7 Identification of barriers
Many of these issues can be traced to the same causes, the underlying barriers to beneficial use. Data is still being entered manually and based on experience but a large benefit of IT-systems is the possibility to automate and build experience into them. Because data is entered manually it is sometimes inaccurate or not entered at all, which leads to poor overview and therefore limited use of Sherpa for strategic decisions or future planning. There are some targets within the studied programmes but they are mostly financial and do not serve to develop the use of Sherpa to be more beneficial. The work that is done to improve the usage of Sherpa is based on bottom-up feedback
within separate user-groups without an overall goal which means that changes are not always aligned towards a common goal (Saab group, 2013d).

5.7.1 Lack of vision
Sherpa was observed to have a bad image, with users regarding it as a hassle and poorly designed, the technicians views it as being in the way of doing their work for little gain. While decentralisation is a known benefit of ERP systems it has caused some problems with transparency that affects how invoices are sent out. With a matrix organisation the functions are specialised but the horizontal communication and collaboration was observed to be problematic with invoices.

These issues are due to the first observed barrier, the lack of vision of what Saab wants Sherpa to do and that points out the direction of what Sherpa should be used for, making it clear on every level of the organisation why it is there and what the goal of the system is. A vision is something to guide the continuous improvement of the usage of Sherpa and where to look for improvement opportunities, to challenge the status quo and examine if the work being done today can be made better. The work today is done in separate functions with locally developed processes that are not based on a holistic view of the greater process. This has led to work being performed according to local requirements but with room for global improvement, and users that do not see the benefit of using such a complex system because of limited benefit to them. A vision is also the basis for setting goals; goals that can be measured in order to track progression and highlight where best to focus efforts for improvement. In the cases studied there were limited use of goals other than financial. Improvement efforts are being done to solve problems with Sherpa but without the vision they are not always aligned towards a common goal.

One of the drivers for implementing Sherpa was the ability to fulfil the vision of Support and Services to take on integrated solutions yet the work within Sherpa could be more integrated itself. When taking on integrated solutions with fixed prices it is necessary to be efficient and minimise costs, by continuously improving the use of Sherpa the efficiency will go up and the return on the investment will be higher.

Saab has the vision of building one Saab, in part by the use of GMS to standardise how work is done throughout the Saab group. Since GMS only covers larger processes that do not take the kind of recurring processes that Support and Services perform in consideration it is not used in the studied programmes.

5.7.2 Lack of processes
Lack of transparency is one of the underlying reasons for the identified issues with invoicing, it can also be attributed to the inaccurate or no data in Sherpa. If there is lack of transparency employees will not know how their errors affect others, and without any kind of feedback loop the behaviour will not change and therefore problems will persist. By standardising processes the transparency is improved when all users are able to see their part of the overall process. The mismatch between Sherpa and business processes can also be attributed to the lack of standardised processes at the programmes, the preparations for the programmes started in conjunction with the implementation of Sherpa and knowledge about Sherpa was limited. It has resulted in Sherpa being used less and employees still rely on legacy software. Since there are no standardised processes, formal routines have not been created which has led to employees performing tasks in different ways, leading to some of the issues with invoices and inaccurate or no data in Sherpa. Therefore lack of formal pro-
cesses is a barrier to beneficial use of an ERP system. Saab also has identified that they have issues with invoicing and during the execution of this study a project to solve the invoicing issues was initiated. Saab further believes that the issues with invoicing is related to lack of processes (Saab group, 2013d) which is in line with our findings.

5.7.3 Lack of ease of use
The main complaint users have is that Sherpa is hard to use, either because it is unclear how to use it or because the interface is complicated. It is hard to learn how to use because the path from start to finish when performing a task is hidden, not logical and differs depending on the task. Without a simple usage paradigm, how to perform new tasks cannot be inferred from what is already known but needs to be learned from the start; something that affects the possibility for inter-programme resource sharing. Sherpa has tried to become a Manipulator (Askenäs & Westelius, 2003) for some users by forcing them to work in a way they are not comfortable with. This has caused the system to be used more like an Administrative assistant by forcing them to work in a way they are not comfortable with. This has caused the system to be used more like an Administrative assistant by causing the creation of ad-hoc solutions and external software use. Since the manipulation failed, the data entry is at the discretion of the user which sometimes results in improper data entry. This could be due to the lack of education and training they have received, the non-existing process manuals or a combination. The program leader on the other hand uses Sherpa more as an Administrative assistant or even Dismissed by just using it very sparsely.

The interface also looks more complex than necessary because every user needs to muddle through all the features and views of the software. Because of the perceived complexity users are less probable to explore ways of performing their work other than what they already know, which makes the discoverability of new functions lower. Because of this, the third barrier identified is that Sherpa is difficult to use, both because of the user experience and the insufficient training. Saab has also started to look into simplifying the interface of Sherpa by adopting a software solution which would be added on top of Sherpa and introduce a simpler and more process oriented way of working (System Engineer, 2013).

The problems and the barriers are summarised in Table 9. A ✓ describes a strong relationship between problem and barrier and a * describes a weaker one.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Lack of vision</th>
<th>Lack of processes</th>
<th>Lack of ease of use</th>
</tr>
</thead>
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<td>Invoicing issues</td>
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<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Mismatch between Sherpa and processes</td>
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<td></td>
<td>✓</td>
</tr>
<tr>
<td>Inaccurate or no data</td>
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<td>✓</td>
<td>✓</td>
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<td>✓</td>
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<tr>
<td>Poor knowledge of key features</td>
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<td>✓</td>
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<tr>
<td>Time consuming</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
6 Conclusions

The analysis shows that the three barriers lack of vision for continuous improvement, no formal processes and lack of ease of use can account for the problems described in this study. With a clear vision it becomes clear what direction to work towards and the efforts can be aligned. Formal processes specify the roles and enhance the transparency within the programmes and improving the ease of use is critical for the adoption of the ERP system on all levels of the organisation.

6.1 Lack of vision for continuous improvement

As has been shown in previous chapters, an ERP system can bring benefits to an organisation that adapts it; at Support and Services the change management has been limited and therefore the adaptation of Sherpa has been limited. Many of the respondents have said that they have understood that Sherpa has great potential and that it is important, but have failed to see the benefits. There is work being done to improve Sherpa, with user-groups and customisations and by using Qlickview to follow up on data. The improvements are however mostly incremental since they are not solving the underlying barriers, not well communicated and they do not adhere to any common vision that a learning organisation need to have. The vision of Support and Services is to be the leading provider of integrated support solutions, something that does not help with the evolution and usage of Sherpa in the already existing programmes. In order to get more out of Sherpa a plan of action should be created with vision of what Sherpa should be used for. Sherpa should get more attention as an ongoing programme that needs a vision and goals to point out the desired state of usage, to show that it is important and that work is done to improve it. Following the performance management framework discussed in the chapter on Control mechanisms, the vision should be broken down into multiple goals that are further broken down and assigned measurable targets, it is important for adaptation that the vision takes all different stakeholders into account and not only the management.

By creating a plan on how to improve it is also possible to share with the employees and communicate what benefits can be achieved if the plan is followed through, it is important to communicate not only the benefits for the company but for the different employees within the organisation. As mentioned in the chapter on Change management, if people have to change without receiving anything for it they will likely resist it more and it is therefore important to communicate so all involved understand that change is needed. It is important that enough communication is done so that people understand that change is needed and so that they are willing to change. There will however always be resistance and it is important to have a plan on how to deal with it, it is important to deal with it early so that it does not get a greater foothold and spread. It is also important to identify and use change agents, even though all organisations have formal leaders, there are also informal ones that are respected and listened to by their peers. If they believe in the change they can help tomove it along faster, partly by spreading the word through their informal communication channels and by dealing with resistance. When the changes are being carried out it is important to celebrate early successes and short-term progress to keep employees motivated. This fits well with the use of benchmarking which enables management to follow up on the change as it is happening, evaluate it and make strategic changes as needed. We believe that creating a plan of action will help improve the image of Sherpa within Saab and since Sherpa has gotten a reputation as being difficult and time consuming to use it is important to work towards changing that image if Saab wants to see further adoption. This can be done with value adding features for the users that reject it, like changing to a more intuitive and usable interface.
6.2 Lack of formal processes

Lacking formal processes is the second barrier found in the study, formal processes in this context means the processes have been deliberately planned and conceived with documentation of what they look like and what the roles are. There is a lack of data in the ERP system that can be attributed to users not knowing why it is needed or how to enter it. The process is not transparent enough for them to know how data entered will be used by others later in the process. By not having a formal process that can be discussed, it is also harder to improve upon it since the logical flow of steps is missing. GMS was supposed to standardise the way of working with flexible standard processes but as observed in the cases in this study, the existing process does not fit and is therefore to a large extent not used. Without a standardised way of working it is harder for users to move between programmes and still recognise the way of working without the need for additional training. While a non-standardised way of working improves flexibility it also adds variation that can be bad for efficiency and makes it harder to accurately make plans.

The processes at Support and Services are planned from an overhead perspective in GMS, but the sub processes are not planned with Sherpa in mind. There are no process flow charts to clarify the process flow and only limited organisational documentation exists for the responsibility of the roles involved. Such documentation would enable all involved to get an overview of who are dependent on their output and who is responsible for their input, making the process transparent as shown in the Process modelling chapter. As further discussed in that chapter, if the process is easy to understand, by for example using process models, it makes it easier to train new users since it is easier for knowledge sharing to occur, which in turn enable easier resource sharing between programmes. It will also make it easier to integrate newly acquired businesses into Saab which is in line with what Saab initially wanted out of Sherpa. By deliberately planning and reasoning about the processes, what Becker et al. (2003) calls process-oriented reorganisation, it becomes clear what can be improved by seeing the big picture, and it clarifies what processes actually exists and how Sherpa could be incorporated in the actual workflow. The planning should be done with users from different parts of the organisation to make sure that different stakeholders views are taken into consideration. With formalised activities and deliverables it can be specified how data should be entered into Sherpa which ensures better overview and possibility for follow-up through benchmarking.

A process with well-defined activities is easier to benchmark and compare over time, as discussed in the Process modelling chapter, with itself or other programmes, which makes it easier to follow up. It makes it possible to track the impact of changes and events and it therefore lowers barriers to sharing experiences between programmes. By benchmarking activities bottlenecks can be identified and dealt with to improve the flow efficiency, which lowers the throughput time and decreases superfluous work due to secondary needs. The level of benchmarking and formalised processes must be well balanced, one way of doing that is by utilising a top-down approach by mapping out the overall processes first and formalising the various activities with added greater detail where needed.

The matrix organisation at Support and Services has caused issues with setting common goals as discussed in the Analysis chapter, the process oriented work should be reflected by the organisation structure to allow for easy interaction and mutual adjustment. The time spent solving small issues that come up can accumulate if not dealt with as shown in the Resource and flow efficiency chapter, so the friction to contact another user should therefore be low, for example by working in the same room. The decentralised responsibilities for sending out invoices have also caused issues at Saab, by
formalising how invoices should be sent out we believe that those issues should go away. This could be done by centralising the process at first in order to work out what works best, before decentralising it again with new and clear directives. A process oriented way of working could allow for fewer handovers by merging activities and letting involved users take on broader and more horizontal work, the users in the merged cross functional activities would each do the same work but on separate flow units.

6.3 Lack of ease of use
Since the ERP system has a complex interface it is difficult for users to learn how to use it which means that they have to be trained in order to use it correctly. At the studied programmes only limited training has been carried out and employees therefore lack a greater understanding of the ERP system and how to use it effectively. The ERP system also has a bad reputation amongst some of the employees since it is difficult to use and they receive limited benefits from it, which further acts as an obstacle which has to be overcome. This has led to problems such as poor knowledge of key features and that it is time consuming to use it. There is also still reliance on expert users, an issue that the implementation of the ERP system was supposed to eliminate. Due to the interface being unintuitive and difficult to use employees have created their own ways of working in the system and it has also lead to users spending more time performing tasks within the system and less time being able to evolve and learn how to improve the usage of the ERP system. The lack of ease of use has in some situations driven users to rely on legacy software to complete their tasks instead of using Sherpa. For management to receive the benefits from the system that was mentioned in the Introduction and ERP systems chapters, users have to use it and enter the underlying data which is not being done today, for this to happen the ease of use has to be improved.

It has been identified that employees that have put in the time and learned how to use the ERP system have started to receive benefits from it. In order to reduce the time it takes employees to learn how to use the system, work has to be put into improving the usability. We believe one way is to adapt the user interface depending on who uses the system, an advanced user should be presented with more information than a casual user. In order to find out what is relevant to the users they could be asked, or their usage could be monitored to get a more quantitative approach. If usage is measured it could also be benchmarked in order to create feedback loops for its users. By using feedback loops users can get quicker feedback to know when they are doing something right and continue, or if they are doing something wrong and change their behaviour.

The usability of Sherpa could also be simplified by making it more process oriented, forcing users into a certain way of working. By guiding the user into a specific way of working it can incorporate best practices and make sure that data that is entered is correct through the use of validation. However forcing employees to do tasks a specific way could lead to them dismissing the system, therefore it is of importance that the processes used be developed together with the employees who are going to use them. If change is forced upon people there will likely be resistance and it is therefore important that the people affected by the change can be part of the development, to gain their acceptance and limit resistance, as discussed in the Change management section. These types of customisations cost money and it might not be conceivable to use them everywhere, therefore it is important to identify which tasks could benefit most from the changes and start out there. If it is the ERP system which is customised it can also cause problems in the future when a new version is released.
Another way to deal with the barrier of ease of use is to train and educate employees; it is however time consuming and thus costly, it should therefore only be used where its potential benefit outweighs the cost. If the knowledge of how to use Sherpa exists within the organisation it is important to leverage that, it is therefore important to try and create a culture of knowledge sharing where employees can help each other. With the new organisational structure, where employees now belong to the programme and takes direction from the programme leaders, we believe that these types of changes should be easier to implement. By adapting open workspaces, where the barriers to talk to other employees is lowered, the potential for knowledge sharing will be increased. In order to create a culture of knowledge sharing it is also important to build up trust between employees so that they are willing to share the knowledge. There also have to be tools which facilitate the sharing of knowledge, for example internal electronic discussion groups where users can discuss issues or solutions related to the ERP system. We believe that a tool like this will also help to codify explicit knowledge so that users with similar issues can use it in the future. Tacit knowledge is however better shared through socialisation or observation which can be done by using job rotation within the programmes, which would be possible if the processes became standardised. Job rotation and standardised processes will also help with the issue of reliance on expert users if more users can gain greater knowledge of the system. Employees that want to learn and evolve should also be encouraged and given tools which enables them to do so, such as internal discussion forums or online courses. These users could be given recognition in order to encourage such behaviour, which could be in the form of more responsibilities. By working towards process orientation it will also become clearer how behaviours affect others which helps create a culture where knowledge sharing is valued.

For changes like these to take place there needs to be continued support from management and if a common vision is used, that support is easier to get. If a common goal is used then synergies between programmes can be had, such as sharing of resources. With management support time can also be put aside where people can spend time on improving their knowledge and usage of the ERP system. We believe that if more people learn to use and start to receive benefits from the ERP system, the system will start to get a better reputation which will result in more people wanting to use it.
7 Discussion

The case at Saab Support and Services shows that there are three main barriers that prevents beneficial use, barriers that could possibly be seen at other organisations as well.

The first barrier, lack of vision for continuous improvement, can be seen as present when improvements are not being done with a clear goal in mind and there are no goals and measurements of the usage to follow up upon. The research of ERP implementation success factors agrees with the notion that a vision is needed, as was found after the study was concluded when we further reviewed articles on the subject. Many authors, in addition to the ones presented in our frame of reference, have written about success factors when implementing ERP systems (cf. Holland & Light, 1999; Al-Fawaz, et al., 2008; Ngai, et al., 2008; Fui-Hoon Nah, et al. 2003) and included vision as one among the most important ones, which gives credibility to our finding.

Davenport et al. (2004) states that many organisations view an ERP implementation as a one-time project and, as can be seen from this case, if work is not continued and aligned towards a common goal, issues will arise. By having a vision, organisations can easily communicate what is being done and progress that is made. As stated by Nahavandi (2009) it is important to celebrate success to keep up morale throughout the change process. If problems are not dealt with directly, new problems will arise because of them, such as lowered morale. It is therefore important to have feedback loops so that the change process can be followed up continuously and the strategies adapted during the process.

The second barrier, lack of formal processes, may be encountered when users are unclear of their roles and responsibilities, and when users in different organisational units are doing the same type of work in different ways. It may also be a factor to why data is not being entered properly that in turn affects the strategic overview of the operations. Some authors (Rentzhog, 1998; Sörqvist, 2004; Becker, et al., 2003) imply that this can be avoided by carefully describing the process before the selection and implementation of an ERP system, but it may also be worth doing after the implementation as well. Business process reengineering is commonly mentioned in articles discussing implementation of ERP systems (cf. Al-Fawaz, et al., 2008; Ngai, et al., 2008) but when the process is partly already in place it will still be valuable to formally describe it and assign responsibilities.

The third and final barrier was seen to be lack of ease of use, the ERP system is too difficult to use. This will be a barrier if it takes users a long time to familiarise themselves with the system and when even experienced users do not know how to perform new tasks. It will affect the data available in the system since users do not know how to enter it properly. The time spent on using the system will be longer than expected and users will avoid using it in favour of legacy software when possible, something that also drives the quality of available data down. There is a lot written on critical success factors in ERP implementation (cf. Al-Fawaz, et al., 2008; Ngai, et al., 2008; Holland & Light, 1999; Fui-Hoon Nah, et al. 2003), we have however not recognised ease of use as a major critical success factor mentioned in the literature. As can be seen in this study however, it can be a major barrier when it is lacking.
8 Recommendations for Saab

Create a work group with members from different parts of the organisation that uses Sherpa and create a vision for what Sherpa should be used for. Make sure to assign someone who is impartial to be responsible for working towards the vision, someone who can look for ways of improvement even where there are no apparent problems, in order to find unknown possibilities for gain. A vision does not have to be attainable; it could for instance include the vision of having all the processes fully automated or to have an interface so easy to use that no education or training is necessary. Use the vision to create goals that can be measured and prioritised and follow up on them, let it be known when goals are reached to show that work is moving forward. Use the vision to inform all users why Sherpa has been implemented in order to improve its image among users, which today think of it as mostly in the way.

Describe the processes in use today, start with a top-down perspective and describe the overall processes and continue with more details in the activities that need it. Make flow charts that are easy to read and compare between different programmes to find what works best. Identify what processes are candidates to standardise and formalise them together with the users involved, make sure to keep Sherpa in mind and if necessary bring in someone well versed in Sherpa from outside. Start out with a pilot study to keep the process flexible and easy to change, when the processes are working well add them to GMS to allow for further proliferation within Saab. By going through the processes inefficiencies can be found, it is easier to reason about a process when it is written down and visualised. It also makes it easier for users to see their role in the process and how their work affects and is affected by others. To work out what the routines should look like it might be necessary to centralise them to one person at first before decentralising them again. With defined activities it becomes easier to benchmark them, to find bottlenecks and ways to improve throughput time. Furthermore it is easier to train new users or users from other programmes which makes it easier to share resources among them.

Look into how the interface of Sherpa can be improved, either by adding a process oriented layer above it, upgrade to a newer version or continue with further customisation by working closer with IFS to see faster turnaround of new features. With well described processes a process oriented layer seems like the best alternative, but it might not work for all situations. Ask users what the biggest issues are and provide directed training, set time aside to be used to learn more of how to use Sherpa. Examine where technical aids such as barcode scanners and label makers makes sense, such as in the warehouse for receiving and picking parts or when finding the right work order in the workshop. Create a central discussion forum for Sherpa where users can ask each other for help and look up already answered questions and reward users that answer questions in some way to drive engagement.
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Appendix A – MPB Request for service process diagram
Appendix B – Interview guide
Themes and some example questions for each theme:

Questions have been followed up with why and how when appropriate.

**Introduction**

- How long have you worked at Saab?
- How would you describe your work at Saab?

**Organisation**

- How do employees communicate with each other?
- Where are there handovers in the programme?

**IFS Sherpa**

- To what extent do you use Sherpa in your work?
- How has Sherpa facilitated/worsened your work?
- What type of education or training have you received?
- How has working practices changed with Sherpa?
- What do you think about Sherpa?

**Management**

- What kinds of goals are there and how are they followed up upon?
- What improvement measures are carried out within the program?

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