Institutionen för Informatik
Handelshögskolan vid
Göteborgs Universitet

THE PURCHASE PROCESS

Abstract

The purpose of this report has been to se what a current purchase process looks like in a major company and how this process can be improved. By being part of a project in a big medical company I show that the whole organization have to change in order for this process to be more effectiv. Buying and selling goods is something that the whole organization is involved in, in some way or another and this means that the process have to be accessible for everybody in an easy and user friendly way. I also show how IT can be used to make the process more efficient and accessible. In order to analyze the current situation and find a better solution I have used the VAC method. I also show how the workflow thoughts are implemented and used in a successful way.

Mats Lundkvist 730802-9375

Magisteruppsats 20 poäng
Vårterminen 1999
Handledare: Jan Ljungberg

Contents

1 Introduction

In the last years it has been talked a lot about the importance of working in processes. The hierarchic organizations are being ”cut down” by methods like BPR. Accounting has also started to change along these lines with methods like ABC costing. Effectiveness and efficiency are words that have got even more attention. The World is changing faster and faster and things in general are getting more complex. IT is becoming a vital part for the survival of more and more companies.

The roles of buying and selling goods have changed and become more important. Competition has hardened and the negotiation procedure demands more skill now than before. Big companies tend to get more global and the small companies are either being bought up or closed down because the ball game is changing. Small companies do not have the power to hold large stock or buy big quantities. They can’t negotiate with big suppliers. The customers are becoming more aware of the price. The profession of a purchaser is more important now than it has been before.

IT has also played a vital part in changing the game. Large investments in equipment and knowledge are needed. (For whom?) IT has made the need to go to the store unnecessary as long as you have a computer with access to the Internet. Internet and IT are being used more widely for commercial use every day.

How does a large company handle its purchases?

Is it process based?

If not, how can it be?

How can the purchase process help and be accessible for each employee?

How can IT support this process?

How are the workflow thoughts implemented in the purchase process?

These questions are explored and discussed by looking at the purchase routines and activities at Astra Hässle, which has resulted in a project aiming to improve and centralize the purchasing routines in order to gain greater control and efficiency.

1.1 Astra Hässle

Astra Hässle is a research company that is part of the Astra concern. They focus their research on Cardio Vascular and Gastro Intestinal illnesses. They produce drug specifications to be approved by the FDA. Their main products are Losec, Seloken, Logimax, Plendil a o. Losec is the worlds most sold drug. The income from this product supersedes all the other products put together. The production of drugs is done in Astra Södertälje. Astra Hässle has about 1300 employees and The Astra group has a total of approx. 20 000 employees. Astra's products are marketed in 45 countries.

At Hässle the research process has four subprocesses. Preclinical Research and Development (R&D), Pharmaceutical R&D, Clinical R&D and an International Marketing Group. They also have additional support departments Finance & Administration, Human Resources & Information and Planning & Co-ordination.

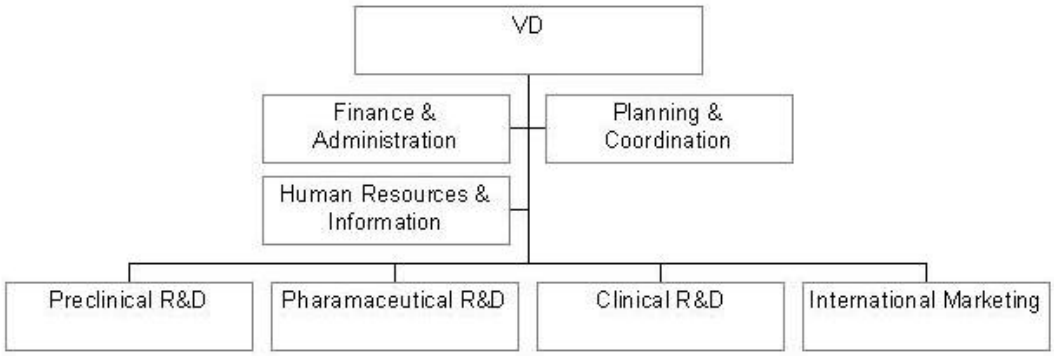

Figure 1. Organizational chart

The Finance & Administration department consists of the Internal Service, the Account department, the Central computer department (IST) and the Security department.

The Human Resources & Information department consists of personell department, The Information department, The Library and the work environment group.

The Planning & Co-ordination department consists of Regulatory Affairs, which takes care of the entire document processing in the company.

Information is the key to survival. The employees have knowledge within areas like chemistry, biology, pharmacology and medicine. In order to be successful in their work they need information quickly and correct. The medical industry is quite a dynamic and complex industry and information is an important competition tool.

In 1996 Hässle implemented an Intranet for the spreading of information. Intranet can be reach by all the employees and has become the most important tool for getting information. With the success of Intranet they made a policy in April 1997 that it should be one of the companies strategic IT platforms. That means that the Web-based user interface should be evaluated when it comes to commercial IT systems or own developed systems. The policy also said that Intranet should help the company become ”smaller”. All employees can easier see ”the whole picture” through an effective information sharing. It should be easier to find information for individuals and for the company as a whole. The line management has a special responsibility to make the use of Intranet as time efficient as possible.

It takes a research and development process of about 10-15 years to get at new product and with an average cost of about 2 bill SEK.

2 The Workflow background

The aim of this report is not to go into great depth in the different theories about workflow, but rather to se how the thoughts are being implemented and how well they work, though a brief background to the different thoughts and ideas, is needed.

A normal definition of workflow is a sequence of actions that together builds a process. These actions often lead to different kinds of information. Even though these processes generally contains social, communicative, cultural and political parts, it is the technology part that has been developed the most when it comes to modeling tools, user interface and databases (Ljungberg, 1996).
A poor understanding of how work routines really work often lead to poor technical solutions. Actions that on the surface seems unimportant can play a vital part in the workflow. The reality is always more complex than on paper.

There are no set definition of what workflow is but here are some suggestions

> *”The computerized facilitation or automation of business process, in whole or part.”*
> *Workflow Management Coalition*

> *” … software that actively coordinates activities of people working together”*
> *Action Technologies, supplier*

> *”Workflow is the sequence of actions or steps used in a business process”*
> *Ronni Marshak, consultant*

> *”Workflow software provides the infrastructure to design, execute and manage business processes on a network. ”*
> *Abbott & Sarin (1994)*

”By Workflow technology we understand any technology designed to (in some way) give order to or record the unfolding of work activity over time by, for example, providing tools and information to users at appropriate moments or enabling them to overview the work process they are part of or to design work processes for themselves or others or whatever. ”
Bowers etc. (1995)

2.1.1 From material flow to organizational processes

There are three main types of processes in an organization. Material-, information- and organizational processes. The processes that we are interested in when it comes to making a business more effective have changed character. The main focus used to be on the flow of goods in an industrial organization and then on the different information processes, but now the focus is more on the organizational processes.

Material processes have its roots in the physical world. They are physical flows that move or changes physical objects like when you transport or store goods. Since Taylor’s days this type of industrial processes have been rationalized by the aid of industrial engineers and mechanical systems like industrial robots.

Information processes are the flows of information, which goes through an organization. In information processes we look at the information, store it and put it together in different reports and lists. In the service sector and administrative work these processes have been radically rationalized throughout the 60s and 70s by the aid of computers. Within the field of system analyses we can find many theories and methods for describing and analyzing the information. What we easily can forget, is that information itself is irrelevant. The information isn’t relevant before the user does something with it. The important thing is how we react based upon the information.

Business and organizational processes are the main activities in the organization and the ones that bring value to the customer. These activities have an important connection to the customers and markets and are in most part communication/communicative processes. To makes deals and promises with the customer and keep them. To create new relations

One can see these types of processes as different abstraction levels. A business process is implemented in an information process, which in turn is implemented in material processes. When a customer makes an order to a supplier this has a physical dimension (the paper), an information dimension (the order with terms of delivery etc.). The most important thing though for the organization, is the business process. That means the activity of the customer asking to perform a certain task and then the customer makes a promise to perform another task in return (the payment).

2.1.2 Speech act theory

Work today consists mainly of communication of different kinds. In the 80's theories were developed that said that people act through their language and their communication with the environment. One of these theories is called Language/Action Perspective (LAP). LAP switches the focus from "people treat information and make decisions" to "people act through their language (Winograd, 1988). These two views do not exclude each other but can be seen as two different ways of studying work.
The LAP theory is based on different language theories, but its focus is not on details in the language but rather on form, meaning and use. These theories have been worked on in order to be used in system development. Three fundamental linguistic concepts build the framwork for LAP (Winograd, 1998)

Syntax: Decides the base elements in the language and how these are combined

Semantics: Is the systematically relations between structure in the language and potential meanings.

Pragmatics: Handles the use of the language, how one phrase or sentence can be interpreted differently depending on the situation, and how the language can be used to generate acts.

Pragmatics is the most important concept of these three. It's not the form but how it's used. One theory that has studied how the language is used to generate acts is the speech act theory. The theory has it's roots in the language philosopher Austin (1962) who said that some types of conversations were activities rather than a description of the world, and that traditional language theories couldn't be used in situations like this. These conversations change the world and can therefore be seen as an act. An example of a conversation is when a judge says a judgment or a priest marries a couple.
Austins thoughts were developed and formalized by Searl the philosopher (1969), which defined five different classes of acts that can be made with the language (Ljungberg, 1996; Winograd, 1998):

Assertive: To describe something, an actual condition. e.g. the sky is blue.
Directive: Tries to get the listener to do something through questions and admonitions.
Commisive: The speaker agrees to an act that lays in the future e.g. to promise or threaten.
Declaration: Change the world by declaring something e.g. impose a punishment
Expressive: Expressing a psychological condition about something. e.g. to excuse oneself.

The speech act theory has been used as a new base for designing information systems. Its greatest supporter has been Terry Winograd and Fernando Flores who have claimed in many years that instead of focusing on storing descriptive information about the world, one should focus on systems that helps people to

communicate and act (Ljungberg, 1996). The main dimension for human interaction and cooperation is the language, and cooperation is coordinated through language acts.

Language acts is not separate actions, but are parts in a greater conversational structure (Winograd, 1998). Conversation means all the coordinating sequences of acts that can be thought of in a linguistic meaning. A conversation is started by a question or an offer, which leads to a number of different actions. All the time there is a limited number of possible actions depending on former actions taken, e.g. accepting an offer or a counteroffer. The conversation is ended when both parts do not expect any further actions from the other part.

2.1.3 Action Workflow

In 1983 Terry Winograd and Fernando Flores formed Action Technologies, INC (ATI). All their products are in one way or another strongly connected to the generic framework for business processes, the Action Workflow, which they have been part of developing. (Flores & Ludlow, 1980; Winograd & Flores, 1986). The action workflow has its theoretic roots in communications theories and then first and foremost the ”language/action” theory. Today one can see the Action Workflow both as a theory, an analytic and modeling tool and as a supporting software tool.

The Action Workflow was developed because Winograd, Flores etc. found flaws in those days analytic tools. They meant that the flaws were particularly great in acknowledging the human actions as part of a business process. Before Winograd, Flores etc. a lot of the workflow technology was based on Taylors thoughts about automation. These thoughts were not as good on complex human work processes as on the material flows and in time with development of technology and the great increase in complexed non-producing work routines one acknowledge the need to focus around information instead of the product.

This is about a decade ago and more and more people have started to realize that not even this is enough in order to understand the complex processes that exist in an organization. Winograd & Flores etc. (1986) says that it’s by looking how people act and communicate in an organization that one really finds out how a process works. They say that information itself is not interesting, it’s what we can do with the information that counts. It’s important to understand that the theory does not underestimate the former theories, it builds on it. The business processes that are recognized are implemented in the information process in the same ways as information processes are implemented in material processes. The theory is just on a different abstraction level.

The main thought that the Action Workflow builds its method around is that all processes consist of only one basic component, the Action Workflow loop. A loop can in turn consists of an unlimited amount of sub loops. Through this it’s possible to all business processes independent of its complexity and rules. The most important are not what the different steps do but how they interact and communicate with each other.

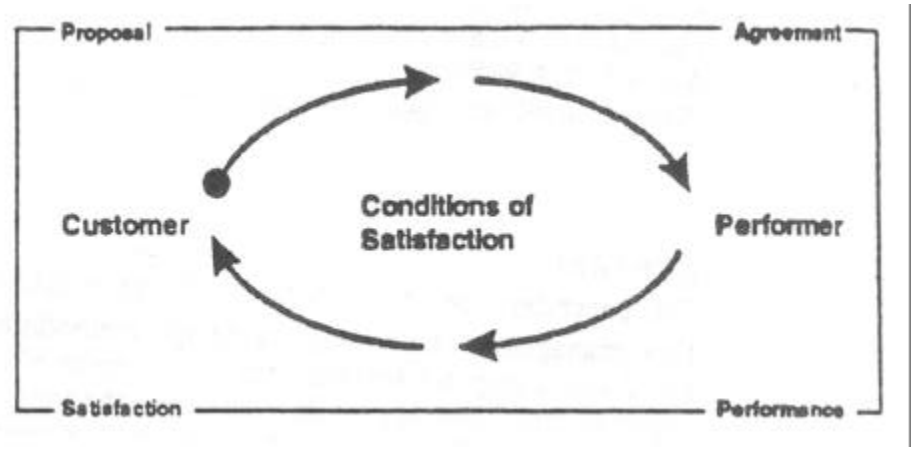

Figure 2. Action Workflow loop

The figure shows the basic sequence of action in the action workflow loop. There is always an identified customer and a performer, and the loop deals with a particular action that the performer agrees to complete to satisfaction of the customer.

1. Proposal

The customer requests (or the performer offers) completion of particular action according to some stated conditions of satisfaction.

2. Agreement

The two parties come to mutual agreement on the conditions of satisfaction, including the times by which further steps will be taken. This agreement is only partially explicit in the negotiations, resting on shared background of assumptions and standard practices.

3. Performance

The performer declares to the customer that the action is complete

4. Satisfaction

The customer declares to the performer that the completion is satisfactory.

2.1.4 Why Workflow

One can ask “why do I need workflow technology ?”. There are several motives.

Better productivity through making the processes more effective is the most apparent and common motive for implementing workflow technology. Through greater efficiency the cost or production time can be cut.

Eliminating waiting time. Many errands spend most of their time waiting in order to be taken care of or for the next step in the process. Through automating the flow one can cut or even eliminate many of these waiting periods.

Reduce costs through cutting resource needs, both human labor and the consumption of paper. It’s often said that time is money. By reducing the time of an errand one reduces the cost also.

Quality improvements are another goal of the workflow technology. The improvements are done by giving support for greater precision, consequent acting and keeping the time limits. Errors can be limited by making the work procedures more standardized. It’s also easier to build in control and validation stops in the process.

Greater customer service is an important quality goal, which is being achieved in different ways by the workflow technology. All information needed about a customer can be at your fingertips when you need it.

Greater control of the process through surveillance and reviewing through the workflow technology. The process generates automatic report over the logistics which makes analyzes a lot easier.

Greater job satisfaction. By reducing the routine work, time is made available for more interesting and satisfying work. Frustration about lost documents will also decrease.

2.1.5 Risks

There are always some risk and negative effects with implementing a new technology. Here are some of the more common ones.

Sequencalyzing. A great deal of the workflow technology has Taylors assembly line model built in, which easily can lead to greater sequencalyzing of the process. In many instances this is less effective than teambased systems. In many cases the effectiveness can be increased by giving greater authority and widen the work assignments to a certain role. An example of this is the Police authorities in Sweden. They changed the passport process from several easy activities to one more complexed activity, which could be handled by one person. The process time went from six weeks to eight minutes (Hällström, 1994).

Rigidity. The workflow systems easily lead to a more rigid process, which can be seen as a straitjacket by the involved users. The purpose with workflow is often to make standardized procedures, and rigidity is then seen as something positive. When handling an insurance claim or an errand in the governmental institutions this is quite visible.

Inflexibility. Most of today's workflow systems do not support dynamic improvement of processes and work assignments . Rigidity in combination with limitations in the possibility to dynamically change and improve processes is a bad combination, which can lead to stiff processes.

Surveillance mentality. The easiness of surveillance in the workflow systems can be misused and be perceived as humiliating.

Underestimating the complexity in existing processes. Existing processes have often grown a long time and one can often over rationalize how work can and will be done. Many practical solutions have grown out of work routines that are not visible. Often this means that the work routines have been worked on for a long time and have been optimized for the involved people, but even ineffective work routines can grow out and be formalized.

The human aspect. To introduce workflow always means changing peoples work habits. For the involved people the systems possess several threats. By making the process more effective the people could be unemployed (often the purpose is to rationalize the workforce). The workflow system takes over the delegating and structuring of work that the middle management used to do which means that their roles will change. These effects depend on which type of process that will be automated and how it's done. In many cases time is being freed from routine work and can be spent on more interesting work and customer care. One must not forget that behind process rules, arrows and boxes are people who perform the work. Underestimating the complexity in their work can lead to devastating consequences. The people who are affected by the system should be involved in the design process.

The market. Many workflow products are new and have bugs. As a result of this the availability of knowledge and experience about these products is often slim. Suppliers have a natural tendency to favor their own solutions. Even if a fitting solution is found it's not sure you can find local design skills. Standard products within workflow are not "plug and play". In order to support complex processes one needs to set aside time for designing the system.

2.2 Middleware

Claire Tristram explains middleware as follows.
Middleware lets developers avoid the issues involved in getting applications to interact with one another across multiple environments. Instead of programming transport-level instructions into each application, the programmers write extension scripts to their software to make sure their applications conform to the APIs within the middleware. The result: the foundation services underlying the

APIs do all the cross-platform negotiations to make sure application requests, changes, retrieval, and updates are accomplished.

The definitions between the different types of computer software are not always clear. Lotus Notes often falls into the group called middleware. In this project it is the “engine” between the purchase system Prosit and Intranet, and it is the product that handles all the communication between the two systems. Notes handles all the information and sort it into different reports and it also makes an entry in Prosit where that is necessary. The way notes is built, it makes it very easy to interact with the web. One can easily build forms and other complex HTML pages and they interact interchangingly with each other. You can make a change either in Notes or Intranet and you immediately see the change in both environments. You can do all the development in Notes and you don’t have to write a single line of HTML in order to view it on the web.

3 Method

The methods used in order to answer the questions in this report are VAC (developed by Frontec), Interviews, End-User test and observation. The development of the IT support for the process has been made in Lotus Notes. The different methods have been used interchangeably throughout different faces of the project.

3.1 Information gathering

3.1.1 Test persons

Since the project has different faces the choice of test persons has been depending on the face and test. At times it has been important to have a broad scope and people from different parts of the organization have been used. Some of the groups have been expected to be test persons because of their job, but in other situations test persons have been randomly picked and it has been ”voluntarily”.

In the initial stages the Senior Management Team (SMT) was used in order to get the strategic viewpoints. Another group, used in order to determine priorities and needs, was the group of about 40 department managers. The project leaders have also been a group that has been used in order to get a deeper and more accurate description of the project. The project has been divided into different parts and with different project leaders.

The IT support has been a very important part and several people from different parts of the organization have been used in order to determine functionality needs and user interface. The ”buyer” has specified the functionality but randomly selected persons have also tested the functions and user interface. The groups have varied from 4 people to a whole department.

3.2 VAC

VAC stands for Value Added Control and is developed by Frontec. This method have been used throughout the whole main project and I will describe the process in more details below. I start with a brief description of the different stages and then I go into greater details on how one uses this method to get result. Since some of the information gathered in this project can be very sensitive the example is made up and has no connection to Astra Hässle.

3.2.1 VAC in brief

A complete VAC project covers Introduction, Diagnosis, Innovation, Design and Implementation. The first three stages can be run independently of one another to a certain extent - in turn or overlapping. Design and Implementation must, however, be carried out in sequence.

The five stages

1. Introduction. Describe customers, business objectives and strategic areas. Define the overall value chain and strategic processes in the business. Describe the current IT support and IT strategy. Select processes and identify the key factors which best reflect performance in those processes. Set new, radical process objectives. Appoint process owners.

2. Diagnosis. Measure the current performance of selected processes. Survey the way in which they impinge on existing functions and which activities and areas of responsibility they cover. Estimate the costs of IT support for the processes in order to obtain a reference value when introducing new IT support.

3. Innovation. Create new processes based on the new process objectives. Define new working methods. Identify the need for IT support. Visualize the new processes and the way in which new working methods and new IT can support them. Revise the process objectives if necessary. Estimate the costs and usefulness of new IT support.

4. Design. Design the new processes in detail and describe the new working methods. Prepare detailed requirement specifications for the procurement of standard software and/or documentation for development of tailored systems.

5. Implementation. Implement new organization and train employees. Appoint an IT coordinator for each process. Introduce new IT support and train the users. Verify the performance of processes against the process objectives. Check the cost and usefulness estimates.

The four rings

As the work progresses through The Four Stages, we document the new processes in the logic structure entitled The Four Rings. These rings describe the business from four viewpoints:

Ring 1: The business system describes the business in terms of processes, activities, process objectives and key factors.

Ring 2: The players' system describes the business in terms of organization, areas of responsibility, activities, players, roles and authority.

Ring 3: The object system describes the business' information requirements as object models with methods and data.

Ring 4: The technical system consists of applications which are based on standardized platforms, i.e. hardware, basic software and communications networks.

3.2.2 Stage 1: Introduction

Strategic areas

We familiarise ourselves with the business concept, objectives and strategy of the company. Who are the customers and what are their requirements? Who are our competitors? What business objectives are relevant? What is the business strategy? What opportunities are there for dramatically influencing competitiveness? Scenarios of the future development of the industry? The work results in a definition of the strategic areas of the business - time to market, quality of service, skills development and other areas.

Process outlook

We view the business in perspective and do a rough survey of the overall value chain. What is the position of the business in the value chain? Which players in the value chain influence profitability? Is it possible to markedly improve the business by changing only the processes or the IT support within the business, or should we involve one or more players?

We also analyse current IT support at an overall level, and we revise the long-term IT strategy Since the business' IT support as a rule impinges on several processes, the IT strategy must cover the overall operations, not delimited processes.

Strategic processes

Those processes which most influence the business' competitiveness are called strategic processes. In our experience, between 6 and 10 sensibly defined strategic processes capture the most important activities in a business. This number includes management processes (e.g. the development of strategies, planning and budgeting) and operational processes (e.g. delivery of service, product manufacture and customer care).

However, *the number* of strategic processes does not of course say anything about *which* processes are important in a business. Hospitals have different strategic processes from insurance companies. Car manufacturers have different strategic processes from schools.

The definition of the strategic areas and the process outlook for your business facilitates the selection of sensible definitions of the strategic processes.

Key processes The longer the process, the greater the potential for improvement, and the greater the difficulty to realise the potential. The shorter the process, the lesser the potential for improvement, and the easier it is to realise the potential.

In businesses with considerable will to change, it is often possible to work with one of the more substantial strategic processes. In other businesses, you have to begin with smaller processes. If, for example, one of the strategic processes is the order/ delivery process, it may be suitable to limit one change project to the order process only, or to the order process for a part of the range.

Those processes which are selected for further work are called key processes.

Management and control

It is important that the change work is supported not only by the top management, but also by relevant function managers. We therefore survey the way in which the key processes impinge on the functional borders, which function managers are affected by each process and who is responsible for which activities in the process. We inform all those concerned about the change work as early as this stage.

Functional managers are clearly responsible for their functions. In order to create corresponding clarity with regard to the responsibility for processes, we appoint process owners and information owners for each key process. He or she should be the decision-maker in strategic issues, preferably the manager of one of the functions included in the process, and be well respected by his/her clients.

Key factors

Those factors which best reflect performance in the key processes are called key factors. Lead-time is always a key factor. However, you can measure the performance of any other important process using VAC, such as customer satisfaction, the way capital is tied up, accuracy of delivery, guarantee costs, personnel motivation, or anything else that you and your customers consider to be important measurements in your particular business.

Efficiency matrix

Set up a new, bold target for each key factor, a time when that target should be achieved, and establish the efficiency matrix *(see matrix below).* The matrix is one of the most important VAC tools. It makes it possible to follow up improvements in performance of processes throughout the change work.

Accuracy of delivery %	Guarantee costs (SEK m)	Total lead time (days)	Customer satisfaction (%)	Amount of tied-up capital (SEK m)		
100	6	3	98	75	10	Process targets
					9	
					8	
					7	
					6	
					5	
					4	
					3	Starting point
					2	
					1	
					0	
10	10	10	10	10		Point
20	10	40	20	10		Weighting
200	100	400	200	100		Weighting points
			Total points	1000		

Figure 3. Efficiency matrix

This is how the matrix works: The following example concerns an order/delivery process with five key factors.

Each key factor is weighted by dividing 100% between the five factors; in this case, 20, 10, 40, 20 and 10%.

Each factor is given a points value of between 0 and 10 when measured, depending on the outcome. The points value makes it possible to compare different key factors with one another, despite the fact that they are often measured in different units (kronor, tonnes, percent, number of errors, ppm or whatever). For instance, the "total lead time" key factor is given 10 points when the process has reached the target of 3 days' lead time, while the customer satisfaction key factor is given 10 points when the process has achieved the target of 98% customer satisfaction.

The maximum points (target points) for the whole process is thus 1000 points, which is the target of the change work (more on the efficiency matrix in the Diagnosis stage).

Also decide on a time when the target should be achieved and appoint a person to be responsible for each target.

Before the process target is fixed, it may be worthwhile measuring its current performance (the diagnosis stage) and identifying the improvement potential of the process (the innovation stage).

3.2.3 Stage 2: Diagnosis

Current processes

It is important to fully understand the old processes before designing new ones. A process diagnosis gives employees the opportunity of gaining a mutual understanding of the current situation. The diagnosis usually leads to insights into the shortcomings of current processes, which makes it easy to avoid the same shortcomings in new processes. It also facilitates the assessment of how comprehensive a change the business should undergo.

Therefore, analyse and document where the current key processes begin and end, which areas of responsibility are affected, what are inputs and outputs, the way in which the processes interact with other processes inside and outside the business, and which sub-processes constitute the key processes.

Current process performance

Measure the performance of key processes and give this performance 3 points *(see figure 4. Efficiency matrix).* In this way, we start by standardising the process performance of all new key factors as 3. The process is thus given a total of 300 points at the starting position (the target is 1000 points).

Using the process targets as a basis, the next thing to be decided is the amount of improvement that is worth 4, 5, 6, 7, 8 and 9 points in each key factor. For instance, the matrix below gives a reduction in lead time from 27.3 days to 8 days 8 points, and a reduction from 27.3 days to 3 days 10 points (the process target for lead time). It becomes easy to manage and control the business *(see Stage 5, Implementation)* if the process improvement is graduated in this manner. The efficiency matrix can also constitute the basis for an improvement-related salary system.

Targets for long key processes such as the order/delivery process should be broken down into targets for sub-processes *(see figure 5. Sub processes).* In this way, you get an idea of where the bottlenecks are. Establish efficiency matrices for the sub-processes and measure their performance.

Accuracy of delivery %	Guarantee costs (SEK m)	Total lead time (days)	Customer satisfaction (%)	Amount of tied-up capital (SEK m)		
100	6,0	3	98	75,0	10	Process targets
99	6,7	5	96	77,0	9	
98	7,4	8	94	80,0	8	
96	8,2	12	92	84,0	7	
94	9,0	16	90	88,0	6	
91	10,0	18	88	92,0	5	
88	11,0	22	86	96,0	4	
85	12,0	27,3	82	100,0	3	Starting point
					2	
					1	
					0	
3	3	3	3	3		Point
20	10	40	20	10		Weighting
60	30	120	60	30		Weighting points
			Total points	300		

Figure 4. Efficiency matrix

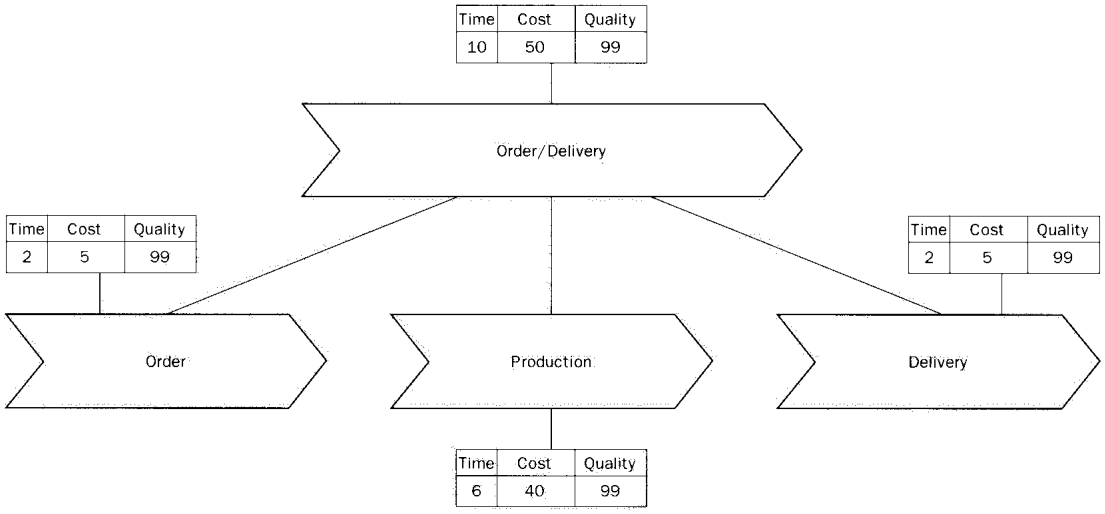

Figure 5. Sub processes

Information analysis

Identify the information interaction between people in the processes. Identify also the flow of information which begins and ends outside the actual business. Produce an information survey connected to the selected process.

Who supplies whom with information? In which direction does the information travel? Which different media are used (electronic mail, verbal messages, standard letters)? Which events and activities trigger the exchange of information ?

Define the content of the information as messages to facilitate the exchange of information between different system environments ~ with the help of AMT (Application Messaging Technology), for example.

Technical analysis

The majority of businesses have tens, sometimes hundreds of function-oriented IT systems. It is important to document which systems there are and how they are linked. Which systems support which processes? How do the systems depend on one another?

We also analyse the costs of current IT support and thus establish a reference value against which it is possible to assess costs of IT support for the new processes.

The technical analysis is a criterion for understanding which financial consequences possible changes will obtain.

3.2.4 Stage 3: Innovation

Process concept
Current process targets and process performance are established. It is now time to create new processes which make it possible to reach the process targets.

Bold process targets require visionary process solutions. Put together an innovation team with representatives of different skills and personalities in the business, possibly together with representatives from other players involved in the value chain. Allow them to create concepts for new key processes together with an experienced consultant.

It is also often sensible to interview people in other businesses on how they have simplified similar processes (benchmarking). Examples of feasible concepts for a few more or less broadly defined processes are seen in the table on the next page.

Confront the innovation team with the process diagrams from the process analysis in the Diagnosis stage. How can the key processes be simplified so that they fulfil the process concept?

Search for signs of inefficiencies in the key processes. Examples of such signs are:

- *Considerable difference between refinement time and lead time*
- *Many formal inspections and checks*
- *Markedly complex working procedures*
- *Substantial stocks or many intermediate stocks*
- *No well-defined customer*
- *Extremely specialised activities*
- *Bottlenecks*

- *Continuous delays and budget overdrafts*
- *Information which is sent back and forth.*

Create new, simpler processes and draw new diagrams. Remove everything that does not add to the value. Permit activities which do not have to be carried out in sequence to be carried out in parallel.

It is important for the employees themselves to be able to create the new processes. This will involve the organization much more than if complete process concepts and process diagrams suddenly fall onto colleagues' desks.

Motivations for change
Motivations for change are phenomena which make change possible and speed it up. We are looking for motivations for change in two areas:

- *Working methods (organisation, skills)*
- *IT.*

The majority of process improvements are made possible through a combination of changes to working methods and new IT.
Examples of working methods as motivations for change are work in cross-functional teams, delivery to the end customer instead of via intermediaries, or transfer of work to customers and suppliers (these measures often require employees to broaden their skills).
Examples of IT as motivations for change are systems which electronically link together several players in the value chain (e.g. EDI), systems which streamline human communication (e.g. document processing systems, electronic mail, personal numbers and video conferencing), systems for computer-aided design (e.g. CAD) and systems which track products in production or in transport.
Motivations for change make new processes possible. However, they can also constitute obstacles to change. Some of the current working methods and some of the existing IT can obstruct the introduction of new processes. Find out in which respects such obstacles exist, and investigate how they can be avoided.

Visualisation
In order to clarify the consequences of the process concept, you must visualise the new processes for employees, management and customers. It gives
them a chance to familiarise themselves with the new processes at an early stage. They are able to criticise and suggest improvements. The more concrete and easily accessible it is to implement the new process ideas in the Innovation stage, the greater the involvement from employees at the Implementation stage.

New process ideas may be visualized through things such as:

- *Role play and video filming*
- *Written documentation*
- *Computer-based prototypes*
- *The introduction of tests in a small work group.*

Process structuring and process contract
Draw process diagrams and describe how the new processes affect other processes, and what sub processes the new processes consist of

In the process contract, the undertaking of each process is formalized against its customer process. The process contract documents the rules of the game - what the supplier should carry out and what the customer should do in return.

In short processes, customers and suppliers are often individuals, departments or functions in the business. For long processes, the customer may be the customer's customer and the supplier the supplier's supplier.

IT structuring
We document requirements for information interaction, define system boundaries and propose suitable future system structures to support processes with regard to the business IT strategy and existing IT

- *Additional requirements for information interaction:* What information is exchanged between the new processes and other parts of the business? These additional interaction requirements set the framework for information interaction within the process.

- *IT to support processes:* The additional interaction requirements make it possible to crystallise the need for information support. We make an object model of a future information system to support processes, with particular emphasis on the section that guarantees that the process can satisfy the additional information interaction requirements.

- *Proposals for a new system structure:* We know the existing system structure from the Diagnosis stage. We can conclude from previous Innovation sub-stages what an ideal future structure should look like. However, it is rarely financially viable to go directly from a structure supporting a function to one purely supporting a process. It is therefore a matter of finding a system structure which can be successively adapted and developed towards the end goal. Create message-controlled links between existing system environments, for instance by using Application Messaging Technology (AMT). Using AMT allows the more rapid design of information support for the new processes. At the same time, AMT affords a longer depreciation period for existing systems and lesser investments in new ones.

We propose a process-oriented IT organisation, probably with well-defined roles and responsibilities, to give future IT support a flexible technical platform and break down the requirement for new IT support into projects and stages.

The basis for decisions
We judge the economic value of expected improvements using the efficiency matrices. The results of the IT structuring and the reference value for the cost of existing IT support help us to compile an investment estimate.

3.2.5 Stage 4: Design

The objective of Design is to produce detailed specifications for the working methods in the new processes and the IT which will support them.

The processes are mainly described with workflow technique (more about that later). Each process is divided up into shorter processes as far as it makes sense to do so. The customer and the supplier, the precise activities to be included and who is to carry them out are defined for each subprocess.

Specification of working method
The roles that are to exist in future processes and the activities and responsibilities, which apply to these roles, are defined at the design stage.

The responsibility of the supplier to the customer and the mutual undertakings between customer and supplier are clarified in the form of a VAC contract for each process. The VAC contract specifies things such as the interaction of information between processes, the way in which process performance is to be measured, who will be responsible for follow-up and the way in which the process will generally be managed.

The method of change must be defined at the same time as the specification of the working method is established. How are we going to change over to teamwork? How are we going to train our employees? Do we need to recruit any new employees? How will we handle any undesirable consequences?

Process change often means that employees have to take greater responsibility in combination with several tasks. New working methods often involve fewer experts and more generalists. Instead of one person entering a patient number on computer, he/she may have to learn to register a patient, cheek the patient's blood pressure and give him/her a blood test, as well as making a rough diagnosis and deciding which specialist the patient should be referred to.

Specification of IT
We know about the information interaction requirements from the Innovation stage. Here, we specify in detail which terms apply to which flows of information. Event ladders are one of many tools used by us to get the hang of the flows.

The event ladder in figure 6 indicates some of the requirements of information interaction between a sales company (customer) and a factory (supplier).

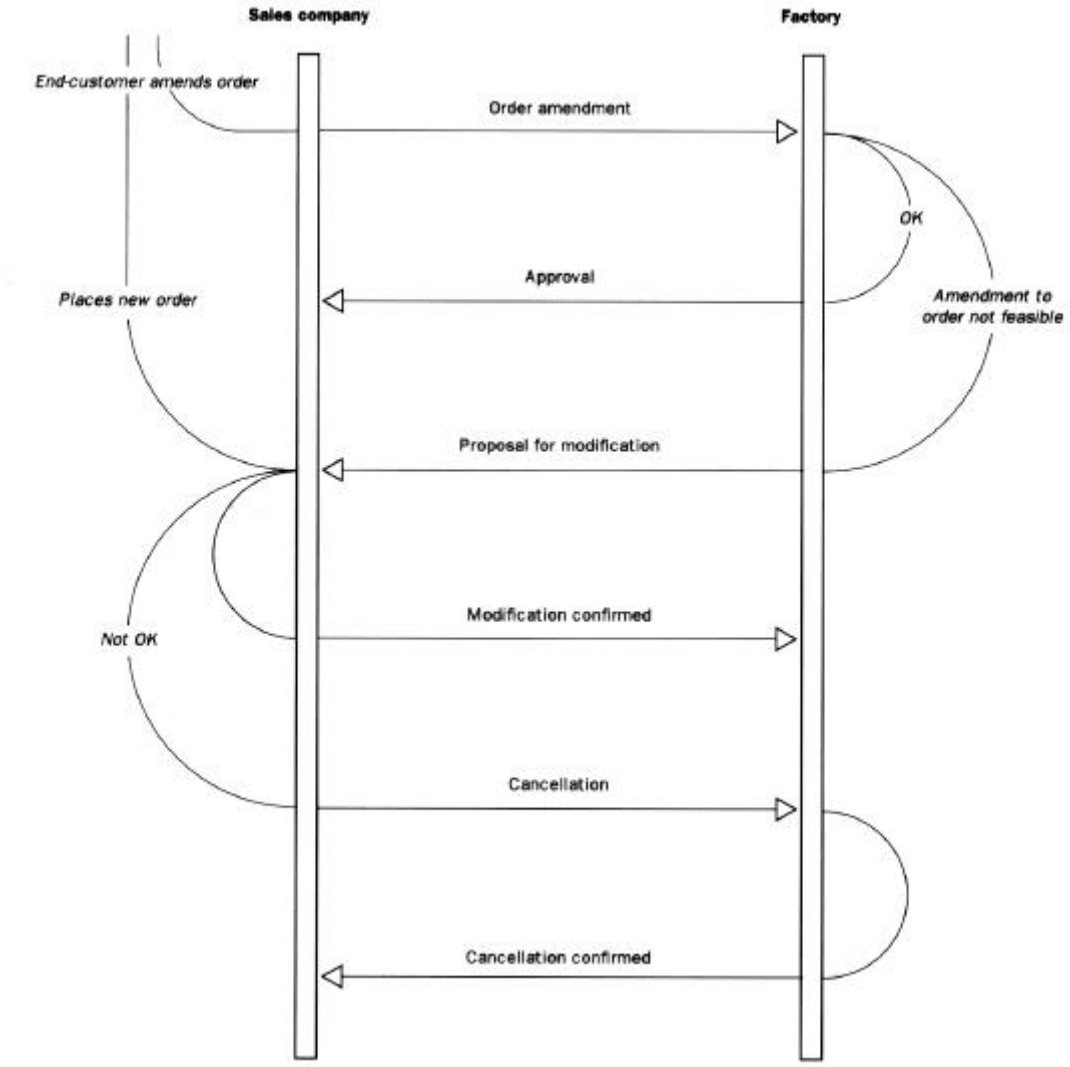

Figure 6. Event ladder

Event ladders clarify the information interaction. We use these ladders to draw up requirement specifications for the information required by the processes and for message oriented integration of various computer systems in the production chain.

By focusing on the interaction between the processes, we are laying the basis of a modular IT structure with independent sub-systems which can be maintained and updated individually.

The requirements specifications then form the basis for purchasing standard software and/or tailored system development. In cases where the information required by the process begins or ends outside the actual business, we investigate the possibility of cooperation in the development of information support with the party concerned, e.g. customs, sub -contractors, retailers and end customers.

The final part of this stage involves our establishing project organization and an implementation plan and appointing people to be responsible for the projects.

3.2.6 Stage 5: Implementation

Implementation involves our putting new working methods into effect, training our employees, introducing new IT and measuring the rate of improvement using the efficiency matrix.

The business
This is the stage where we begin to discuss personnel and organisational matters. By postponing these issues, we keep the focus on what is the right plan of action and how it should be carried out rather than who should carry it out.

We link roles, objectives and responsibilities to individuals, train staff in the new working methods and establish descriptions of objectives and responsibilities for each individual.

We review the organization. Discussions concerning process and line organization are often held at all stages of the method. At this stage, thoughts have often matured in the minds of the management. Process organization can often rest on top of the functional organization.

IT The technology for implementing the IT support for the new process must fulfil the long-term requirements of the business. It is therefore important to select tools and software which are well tried and tested and which are being continuously developed.

It is also important to carefully survey different ways of integrating new systems with existing ones. Integration can either take place in
large system packages as automatic functions between the modules or as specific supplementary functions (e.g. EDI). Here we also establish roles and responsibilities in a permanent IT organisation, and verify cost and usefulness estimates.

Process targets
Having new, simplified processes and new IT in operation, it is time to measure process performance. Once again, the measuring tool is the efficiency matrix that we established at the introductory stage. This matrix makes it easy to measure process performance continuously and accurately. In this example, process performance has increased from the standardised 300 points on which it started to 740 points (the target is 1000 points). Regular measurement using the efficiency matrix offers many advantages:

- When people receive continuous feedback of the results of their efforts, their motivation to work is increased. They themselves maintain the pressure for change, without being monitored by managers or consultants. A culture of continuous improvements is established.

- Managers obtain those measurement and guidance tools they require so that they can also manage a completely process-controlled organisation.

- It is easy to estimate the profitability of investments in business development and IT.

Accuracy of delivery %	Guarantee costs (SEK m)	Total lead time (days)	Customer satisfaction (%)	Amount of tied-up capital (SEK m)		
100	6,0	3	98	75,0	10	Process targets
99	6,7	5	96	77,0	9	
98	7,4	8	94	80,0	8	
96	8,2	12	92	84,0	7	
94	9,0	16	90	88,0	6	
91	10,0	18	88	92,0	5	
88	11,0	22	86	96,0	4	
85	12,0	27,3	82	100,0	3	Starting point
83	13,0	28,6	82	101,0	2	
80	18,0	32	80	102,0	1	
75	18,0	32	75	103,0	0	
3	3	3	3	3		Point
20	10	40	20	10		Weighting
160	60	280	180	60		Weighting points
			Total points	740		

Figure 7. Efficiency matrix

3.2.7 Ring 1: The business system

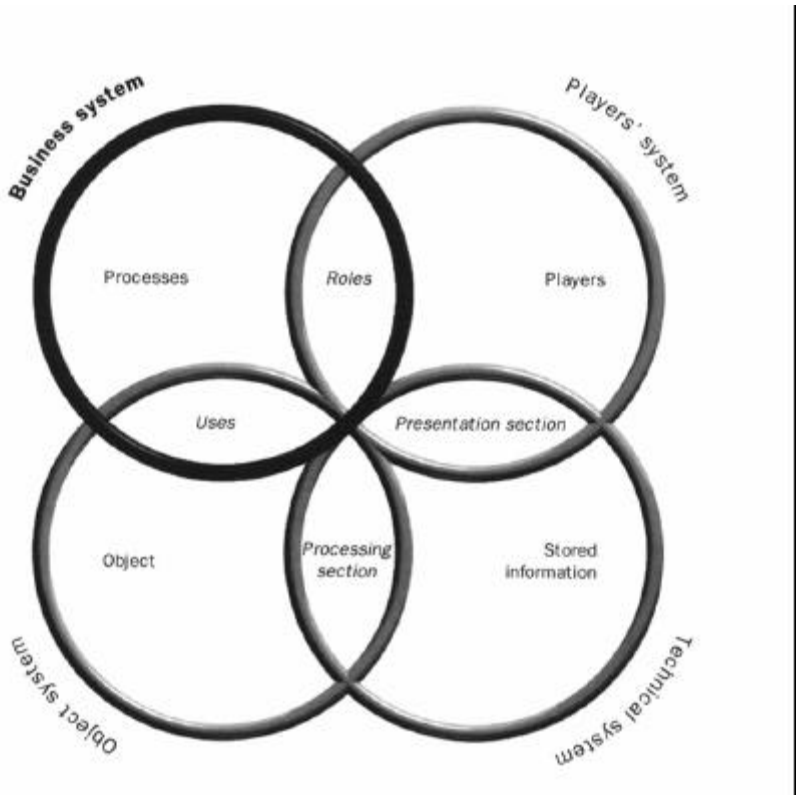

Figure 8. The four rings

The business system specifies processes, activities, process contract, efficiency matrices, key factors and process targets. By using workflow technique, we are able to break down complex processes with abstract and overall activities into simple processes with concrete and defined activities. Workflow technique offers the following advantages:

- *Focus on roles, reducing territorial disputes and facilitating the management of resources.*
- *Easy to measure and feed back the result for continuous improvement of the process.*
- *Easy to see where IT needs to be introduced to support the process.*
- *Easy to translate the workflow to an object model for information support.*

The basis of workflow technique is the simple structure you see in figure 11. There are three roles in the workflow: customer, supplier and observer. A customer can be internal or external, as can a supplier. An observer is someone who is dependent upon the result of a certain process to be able to carry out his/her tasks in another process. A supplier in a process may thus be an observer in another one. A workflow consists of four phases. In phase one, a supplier offers something to a customer (or the customer takes the initiative). Phase one may be concerned with a tender for the order/delivery process.

In phase two, an agreement is reached between customer and supplier. The supplier promises to carry out a task and the customer promises to do something in return - to pay, for example. Phase two may involve writing a contract and processing an order.

Phase three consists of the supplier carrying out the agreed work. This phase may include purchasing, production and delivery.

Customer satisfaction (high or low) occurs in phase four. This phase may mean that the customer says, "thank you very much" and pays the bill. It may also include invoicing and follow-up with service and customer interviews.

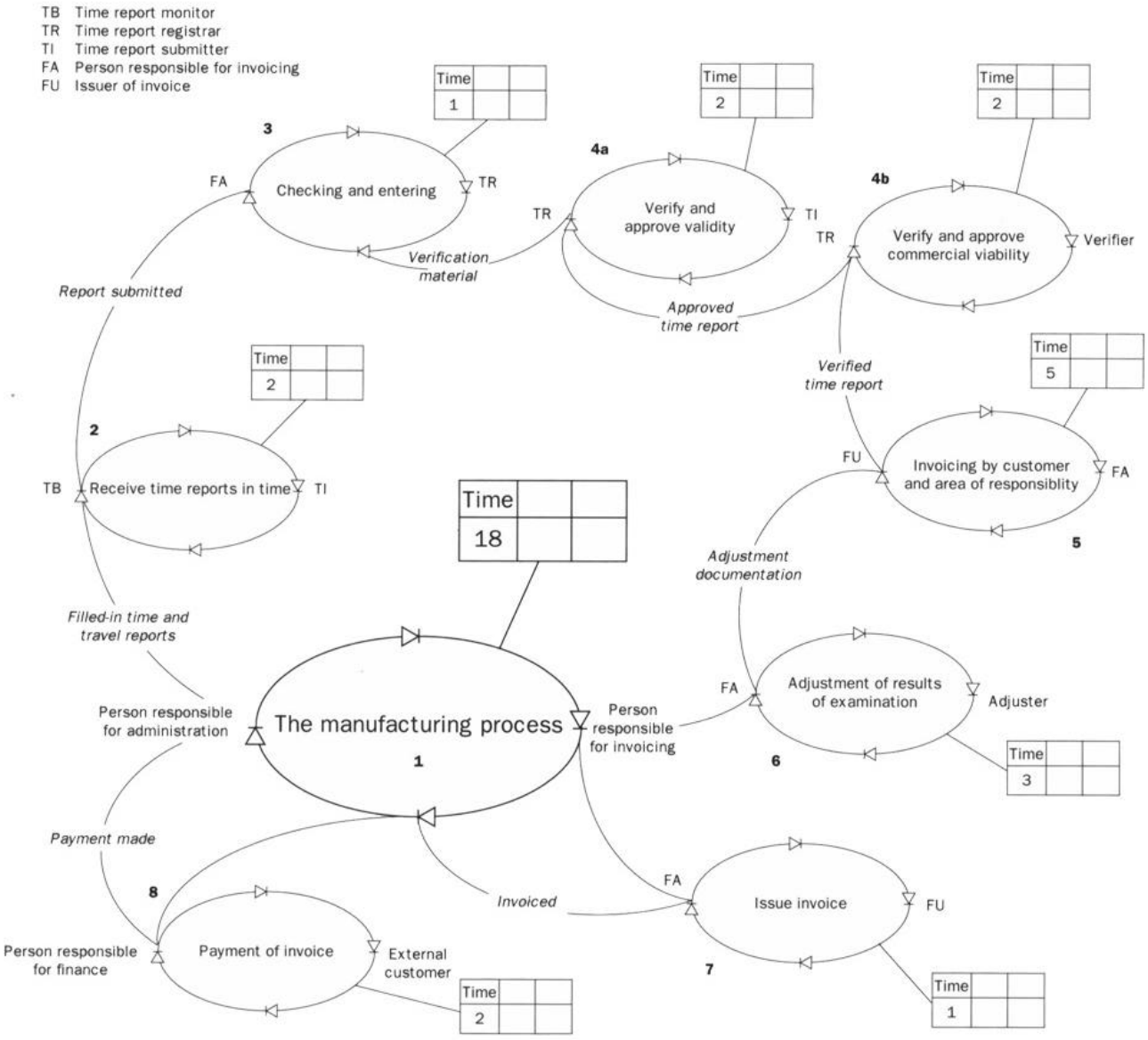

Figure 9. The invoicing process

Example: The invoicing process
The business system specifies customer, supplier, observer, process contract stipulating what the customer and supplier are to carry out, and efficiency matrices with process targets for both the process and the sub-processes constituting the process *(see figure 9. The invoicing process).*

Uses and roles
The requirements of the business in terms of information support are captured by the concept of usage, which builds the bridge between the business system and the object system. Who does what in the business system comes under the concept of roles, which builds the bridge between the business system and players' system.

Activities and roles
A process consists of one or more activities. The people who carry out the activities carry them out as customer or supplier (roles). One role may be linked to one or more processes.

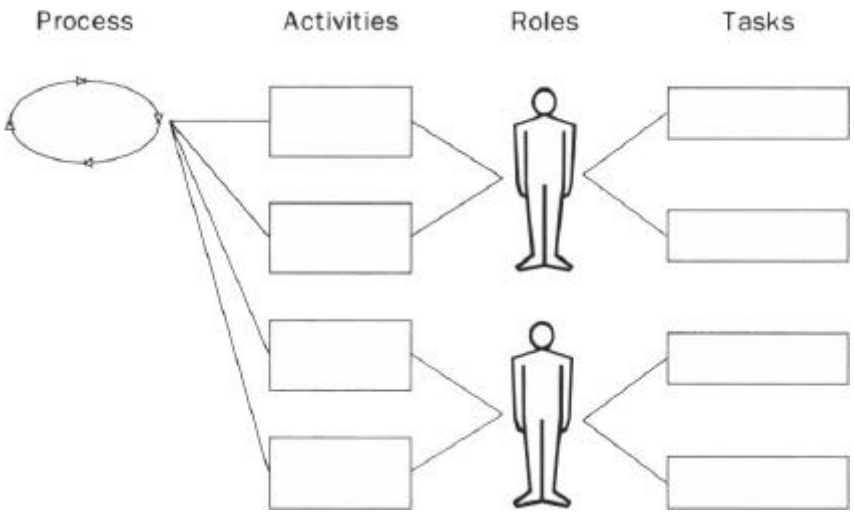

Figure 10. Activities and roles

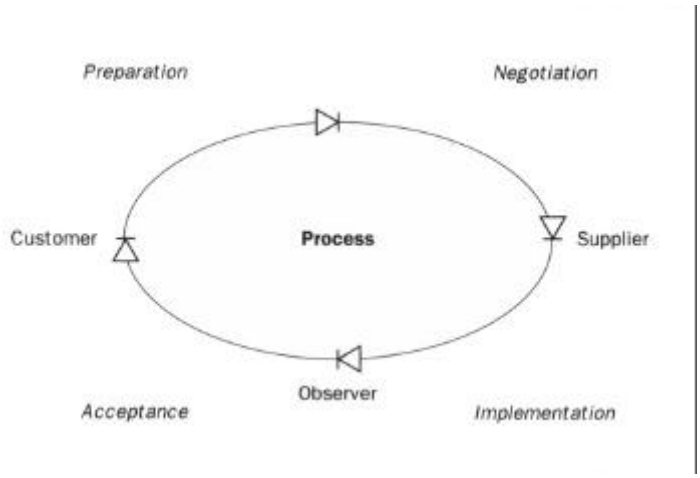

Figure 11. VAC Workflow loop

3.2.8 Ring 2: Players' system

The players' system specifies those resources required to carry out the work in the processes described in the business system. The players' system focuses on the organisation of the business, personnel and the requirement of computer-based tools. By using the information in the players' system, we are able to design a user-friendly information system.

"Organization" means, for example, formal organization, decision structures and positions with associated authority and responsibilities.

"Personnel" here means those players who are included (e.g. system developers, controllers or system development managers), the roles they play (customer, supplier or observer) and the activities carried out by each participant.

Roles build the bridge
Processes consist of activities performed by individuals. One person can play different roles in different processes (customer in one process, supplier in another).

The activities are specified in the business system. The role concept links the activities in the business system with the individuals in the players' system.

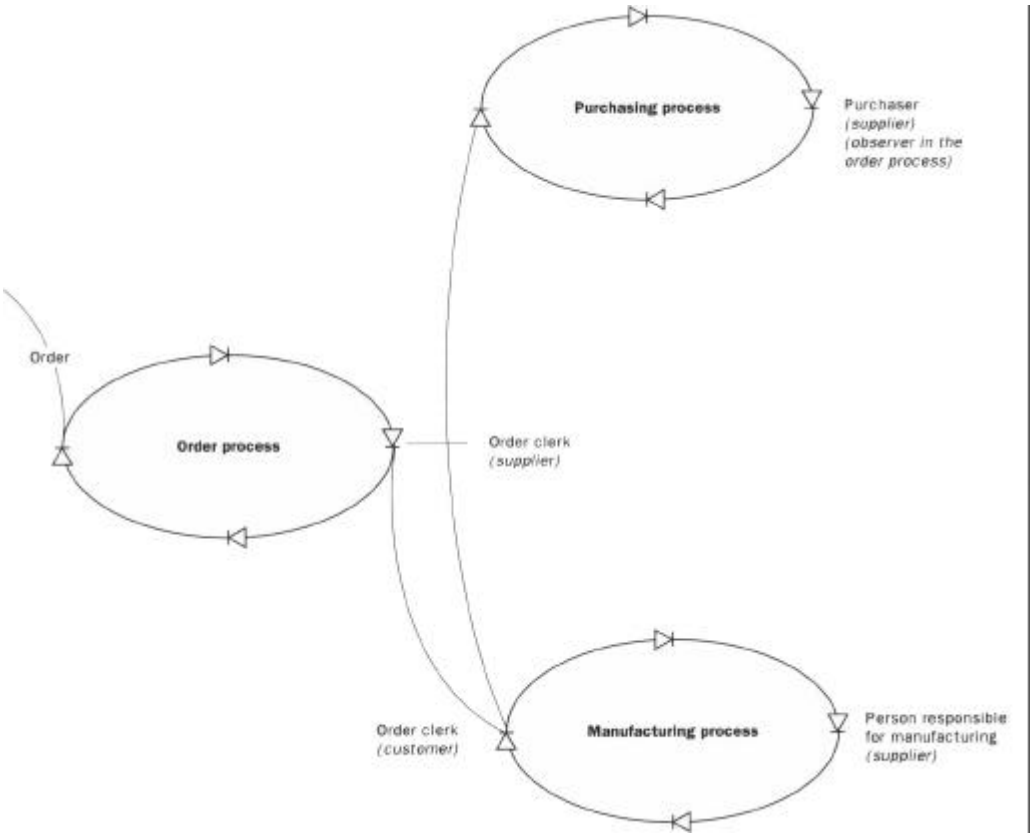

Figure 12. Roles

Example: Roles
When an order arrives, it is dealt with by the order clerk, the supplier for the order process. To satisfy the customer's order, the order clerk acts as a customer in the manufacturing process. The order clerk is thus a customer in one process and a supplier in another *(see figure 12. Roles).*

In order that the purchasers know what and how much should be purchased, they need regular information from the order process about the external customer's orders. The purchaser is thus a supplier for the purchasing process whilst being an observer in the order process.

3.2.9 Ring 3: Object system

The business system describes the dynamics of processes and activities. The object system contains object models of the processes. Each object contains methods and data as an encapsulated unit.

Uses - the bridge to the business system
The requirements of the business system regarding information support are conveyed to the object system through usage. Usage is structured in a way which suits the users. Examples of usage:

- *"Register order for a customer"*
- *"Amend the price of a product C*
- *"Information on delivery of a product C.*

The "Register order for a customer" use then contains the following:

- Ask the customer for his/her customer number
- Cheek whether the customer may purchase by looking at the register of customers. If not, the usage returns a status flag and is included
- Enter order in order register and link to customer
- Reserve goods in stock.

The concept of usage makes it possible to achieve uniform processing regulations and user-friendly dialogues.

Links business with the technical system
It is comparatively easy to translate the workflow into specifications for the new, process oriented information system using object modelling. The object system links the business system with the technical system, providing a seamless link between the business and its process-oriented information system.

The processing section - the bridge to the technical system Today's object-oriented databases do not perform sufficiently well to store all information on all objects in a business. The object system therefore uses the technical system to help it store data. The database is thus stored in the technical system. However, in order to access data on an object, it is necessary to call up objects in the object system. It then communicates with the database in the

technical system. The bridge between the object system and the technical system is the processing section.

3.2.10 Ring 4: Technical system

The technical system provides the business with computer-based services. It is subordinate to other systems and contains hardware, software and databases.

The bridge to the players' system
The applications consist of a presentation section and a processing. The presentation section is the bridge between the players' system and the technical system. The formula model describes the user interface. The outlook module takes care of communication with the processing section.

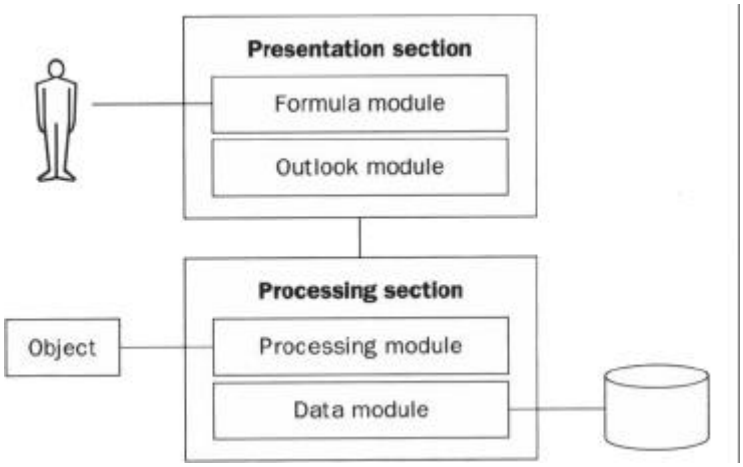

Figure 13. The bridge to the players system

The processing module communicates with the object model to obtain logic and methods to the objects, which the user will process. It retrieves data from the data module. Since all data is stored separately, there is no trouble in exchanging one or more modules.

Infrastructure and information integration
The computer systems, which together constitute the technical system, interact according to the rules of the business system. The information interaction is defined there by the content and structure of the message. Information interaction can be implemented using Application Messaging Technology (AMT).

Several technical sub-systems can thereby be seen from the players' system as functioning transparently, with applications such as groupware and computer-aided document processing (DDH).

3.2.11 Interviews

Interviewing is a good method to obtain information and compare it because you have the possibility to ask the same questions to many people. This method was used on a few occasions. Open interviews without a set order of questions is

also a useful method. The problem with this method is that the answers are difficult to compare. In some cases this is not necessary and then it's very helpful. I used more of this kind of interviews than the set forms.

3.2.12 End-User test

Astra Hässle has a special room for end-user tests. This room is specifically built in order to test computer applications and document it at the same time. The person performing the test sits in one room and is given a number of tasks to perform. As he performs the test he is videotaped for later analyses. The person is asked to talk aloud and also say what he thinks. Usually a helper is also placed in the room for additional help and guidance in performing the test. Several persons can sit in the room opposite and observe the test as it's being done.

The person sitting in the room knows he's being videotaped. This might make him feel a little uncomfortable but the extra person in the room can help in this matter. Some of the end user groups have used this facility in their test and it has been very fruitful.

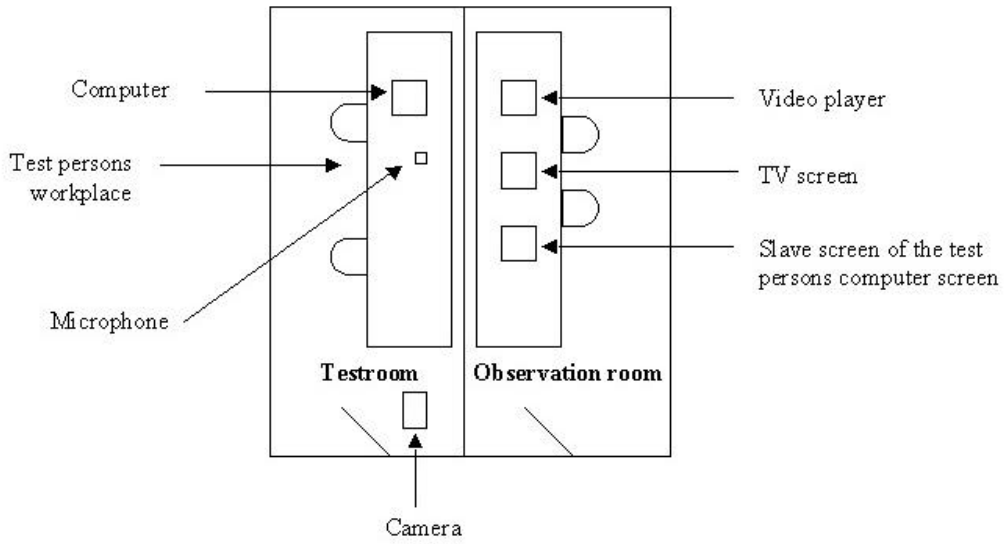

Figure 14. End-user test room

3.2.13 Observation

As I have been actively engaged in the project, some of the findings are based on my own observations. Observations is a good method because you se what people really feel and not what they portray to feel. The findings in observations are often subject for interpretations and can be subjective at times. Even with the possibility of subjective interpretations I think it's an important method.

3.3 Procedures for observation and analyzing

Different procedures have been used in different faces of the project and therefore I will account for the different faces. The VAC method have been used throughout all the faces

Face 1 – Initial studies

The main source of information has been interviews. Different people from different departments have been interviewed in order to find out as much information as possible. Frontec has been hired in order to help in this face. Frontec has developed a work process they call ”A Flight”. This 3 day intensive process should result in an analyze of the current limitations and problems but also suggestions of the changes needed to be done in order for the process to run smoother. It’s very intensive days for all parties involved but it has shown to be very fruitful. Interviews and group discussions are the main sources of information in the flight. The Flight was one of the means of analyzing the situation.

Face 2 – Planning for the change

The suggestions for changes need to be further analyzed and planned. In this face group discussions have been frequently used. The plans have then been discussed further with specialists on the different subjects, but also with the senior management. Personal observations have also been a big information source. The plan for IT support has been a big part of this face.

Face 3 – Development of IT support

In this face different user groups have been used in order to determine some of the functionality needed. The main group has been a group mixed with people from different backgrounds in order for the system to be able to span over the whole company, and make the system as useful as possible. End user tests have also been used for information gathering. Consultants have been engaged quite frequently for the purpose of helping to solve and analyze the different problems. The main source of information in this face has been personal observations.

Face 4 – Implementation

Interviews have frequently been used in this face to find out what the users think. End user tests and personal observations have also been a great source of information when it comes to which strategy to use for implementation.

Face 5 – Evaluation

As this report is written the project it not completely finished, as this process is an ongoing process that will take several years to complete. There are plans for how the future evaluation should be carried out and several parts of the project have already been evaluated. The main source for analyzing in this face has been interviews and personal observations.

4 Results

Hässle has different groups of people with different culture. Some of these groups, like the scientists, are very strongly represented and therefore have a lot of power. Their culture does not always go along with the other groups and this can at times make decisions making difficult. There are also individualists who like to decide by themselves and they have got a bit too much control. These are some of the reasons why it has been difficult to implement a central purchasing process. People and groups tend to order things by themselves. This contributes to higher costs and less control. They have tried to centralize their order routines twice before, but failed both times. The project now started aims to get more control over the routines and save money. They call the project Unicorn.

4.1 Situation at project start –Initial studies Face 1

Hässle has a yearly purchasing volume that is valued to 1 billion SEK. They have 4500 suppliers and an increase of 10 a week. 29 % of the suppliers count as active. 6 % of the suppliers count for 80 % of the purchasing value. 12 % of the purchases are covered by contract and 16 % of all the purchases is negotiated.

Poor supplier evaluation

They only have supplier evaluation on large centralized purchases. The process of evaluating a supplier is not set and can at times take a very long time. In the past it has also been very subjective. A company that has a friend or a relative at Astra can at times be chosen even if they don't have the best products. There is no control of suppliers on a lower level. Anyone can order products from which supplier they want. This can create a problem when it comes to support and warranty questions. The price is often higher than it needs to be because they don't buy big quantities and no contracts are made.

Purchase request made after purchase

Since routines are failing and at times are very slow purchase requests are often made after purchases and in this way loose their meaning. This can also create big problems for both Astra and the Supplier since the purchase is not authorized before the order is made. Often this neglect is done because of time shortage. They need the products now and can't wait for all the papers to be signed.

No budget follow-up

Hässle has experienced enormous success lately and have been spoiled with a lot of resources. There has been no need to save anything and they have not done so either. Most of the purchases have been made outside the purchase department control and budget follow-ups are made very difficult. At times the goods are put under the wrong account or put together with something else. There are no specified budgets for goods either. All these factors make budget follow-up to difficult or they don't feel it's important enough because they have enough of resources to skip it.

No reporting of errand status
Orders are made and then you hope your products will arrive. There is no reporting of errand status. This can at times be very frustrating but also time consuming. The person making the order needs to make additional calls and put time and effort in finding out how far his order has come and if it's coming at all.

No delivery control or routines for delivery approval.
The goods arrive to the person that ordered it. He himself then has to control the delivery. If it's something's wrong he has to fix this himself. He also needs to check if all the goods are there. If it's a small order it's no problem, but if several products have been ordered he needs to have the orderform and check it against the invoice. This takes a lot of time and is therefore often skipped. Routines for delivery approval doesn't exist except for purchases made through the purchase department. The supplier doesn't have so big a responsibility as he should have.

No defined responsibility for purchasing
In each department there is no defined responsibility for purchasing. Therefore all employees are considered purchasers. In that sense the purchase department consists of 1200 people. Purchasing is not considered a profession. The profession has got a low status in many peoples eyes, they are not aware of the increased skill and knowledge needed.

4.1.1 Present Situation

The figure describes the present routines of buying and selling. It shows that the routine is very split up. It's no set order, and can look quite unorderly. It also shows that the person ordering the goods is the one responsible for receiving it. He needs to do all the work. He needs to make sure it's signed and confirmed. All the contact with the supplier is also his responsibility.

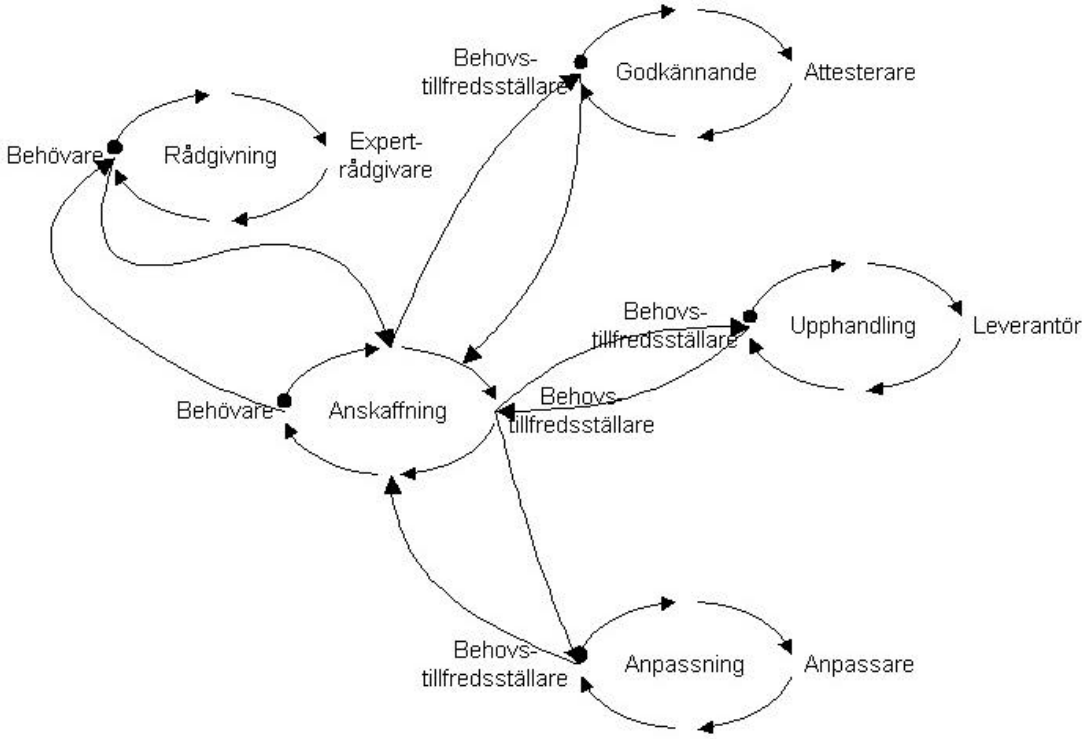

Figure 15. Present situation

Competence demand not defined and no development of competence

It is a lack of competence when it comes to purchasing. This has to do with the lack of knowledge of the purchasers' role. They do not know what is needed in order to become efficient and effective in buying and selling. When there is a lack of competence it's understandable that the routines are failing.

Employees

About 80 persons had as an important part (equals 24 full-time employees) of their job to act as a purchaser. They gave preference to the following parts of the purchasing process: Commercial advice/support/cosulation, negotiation support, making up contracts, follow-up and statistics

4.1.2 Future Vision

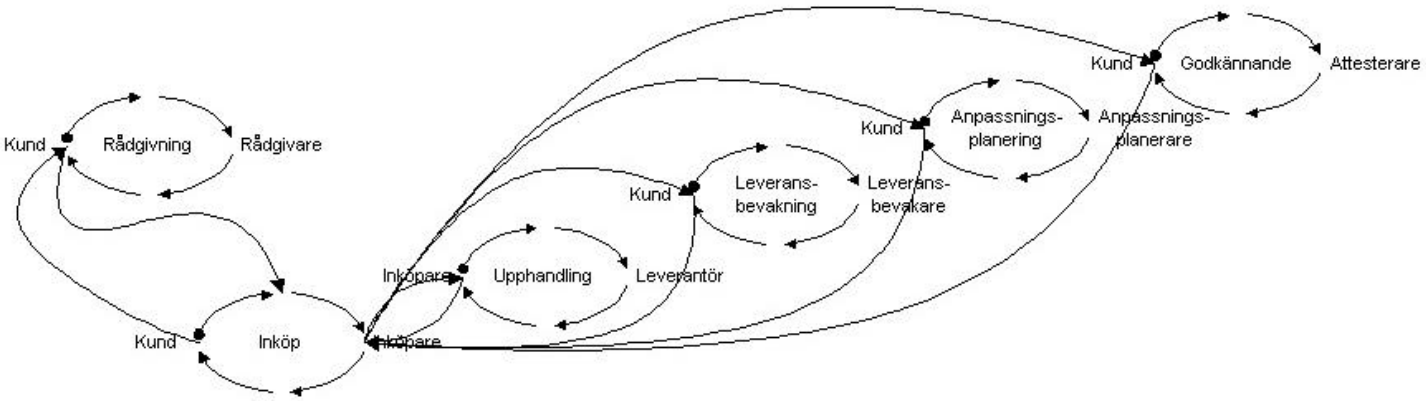

Figure 16. Future vision

There is a clear difference between figure 4 (current situation) and figure 5 (future vision. The current situation shows that there is no set sequence of events or actions. After one action have been taken one don't know what the next will be or what rules to follow. This leads to obvious confusion and a greater complexity. The process is not very effective and the cost is great. The future vision shows a clear smooth process with a certain sequence of action that should be done. Clarity and greater control are some of the effects of the future vision. From the findings in this report I think these two pictures portray both the current and future situation in a perfect way.

4.1.3 Important findings in Face 1

Competence must be improved
In order to make the routines more effective and efficient competence must be improved. An increase of competence will give the company a different view on the purchasers' role. The ability to make deals and write contracts will also be improved.

Lead times must be shortened
The time it takes from making an order until it's processed and delivered must be shortened. One of the reasons why people order by themselves is that it takes to much time to go through the right channels.

The process must be measured
In order to be able to se the improvement in a process it's important that it can be measured. This at times is very difficult but it's very essential.

Figure 17. Responsebilities

Supportive routines and system
In order for the purchase process to work smoothly, support routines and systems need to be established and work properly. When there are existing routines to handle problems, the problem is easier dealt with and the ”user” thinks the process is still working smoothly. If the routine fails or don’t exist it can jeopardize the whole process.

The purchaser must have the overall responsibility
In all processes there has to be a process owner. In this case the purchaser should ”own” the process. With a process owner it’s easier to change the process and someone has the responsibility if something goes wrong. You always know whom to contact if you have a question or point of view

4.2 Key success factors – Planning for change Face 2

4.2.1 Establish a purchasing network

A network of local purchaser needs to be established. A local purchaser is a person sitting in one department dealing with. the purchases of that department. When all the local purchasers have been established they should be a network helping, and sharing information with each other. The organization needs to focus on these local purchasers. The work should be centered on them and all purchases in a department should go through their own local purchaser. This is meant to make the process smoother and more flexible. This also bridges the problem with the different cultures. Everyone has a purchaser who understands his or her needs.

The purchaser role must be clearly defined so everyone knows what’s expected of him or her. Their competence needs must also be defined so they know what sort of knowledge a good purchaser needs to posses.

4.2.2 Increase competence

The present level of competence must be measured and put up against the needed level of competence. The gap must then be filled and they need to create plans and programs for achieving the new level of competence.

The illustration below shows the current level of competence. Competence is specified per person but competence requirement is specified per role.

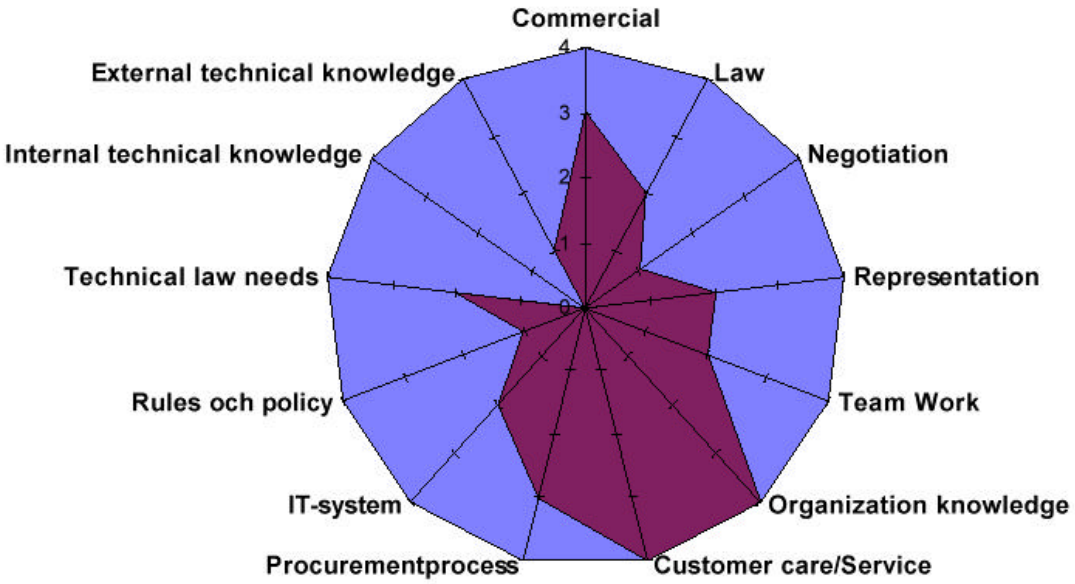

Figure 18. Current competence

4.2.3 Professional purchaser work

The purchasers need to be professionals. They need to use commercial negotiation and commercial assessment techniques. The rules and regulations in the different trend of affairs are vital for a company's survival. They need to be able to write professional contracts and be a good negotiator. As part of the contracts they need handle the different guarantees and possible service intervals.

In big companies like Astra Hässle they need to use their ability to buy in big quantities and to coordinate their different purchases, so they can get the best price and condition possible. They need to have control over the deliveries and also on possible reclaims. This can save an incredible amount of time and money if it's handled correctly.

4.2.4 Improved routines

The different responsibilities between the consumer, local purchases and central purchaser needs to be set. All need to clearly understand their different responsibilities and also the responsibility of each other. This goes especially for the local and central purchaser.

The routines for a purchase need to be simple and clear. There should be no doubt at all about the different routines and where to find them. The certification process needs to

4.2.5 Implement a new purchasing system

The new purchasing system must be easy and rational to administrate. The ability for follow-ups and statistics on the current system is not good enough and the new system needs to improve in these parts. Any change to the delivery process, which is out of the ordinary, needs to be reported. The system should also be able to follow up against the budget. It should easy show how the current situation is against the budget. The internal lead-times must be shortened and all the documents used in the purchaser process need to be standardized

4.3 The new purchasing system – Development of IT support Face 3

A new purchasing system, called Prosit, was purchased from WM data. There was put in quite a bit of effort in order so select right system and even more time to implement it. (A diagram showing the different questions and evaluation methods can be found in the appendix) Prosit is the base of the purchase system. Here you can get all the information you want and all the statistics. This system is only used by the local and central purchasers. Since a lot of people in the company orders different products it was important to build an interface that could support these people in their ordering process. It should also eliminate a lot of paperwork and telephone time.

4.3.1 Platform & User interface

There had been quite a lot of discussions on which platform to use and which development environment to use. The lot fell on Lotus Notes as both a platform and development environment. Notes was designated the best platform for document handling. Notes concept, goes along the lines of the Workflow principles. This is very useful for handling the process of certification and also to decide who should expedite the order.

Notes also have another unique ability of publishing things in HTML format. Because of a policy decision to use Intranet as the main line for information publishing it was decided that the user interface should be in HTML. This was very convenient because employees were already familiar with the technology and everyone already had access to it. The infrastructure and habit of using it already existed.

Notes are a 4-generation language and this makes it quite easy to change and update. Notes were already widely used in the company and the knowledge of administrating and supporting the product was already gained. Several persons possessed this knowledge and even more were in the process of gaining it. All these factors helped in choosing the product.

4.3.2 More applications

The new system was not only supposed to handle purchases that went through Prosit but also other internal purchasing requests like presentation material, office supplies and helpdesk inquiries. In the beginning it would only be about 5 different parts but as soon as people noticed the potential they also wanted their applications made in the same way. In the moment of writing 15 different parts are being implemented and even more are planned. The system turned out to be something much bigger than expected.

4.3.3 Structure

The structure of the system is made in a way that it should be easy to implement new parts and also to change and update the system. The system has a lot of subsystems. The subsystems have their own system owner and he's also responsible for local updates and changes on his system. There is a part called the umbrella where all the different users come to. Here they can see their own order and also how far it has come in the process. From here they can navigate to each different part of the system and as soon as they make a choice they leave the umbrella and end up in the local system. The local system then has different features depending on what they were built for. There are links and agents that handle the communication between the local system and the umbrella. The system also consists of other databases with information about users and articles. The local systems can access these systems if they need to.

In order for a system to be incorporated into the bigger system it needs to follow certain rules and also it need to look a certain way. All the local applications have the same user interface and design. The user should not notice that he leaves the umbrella and goes into a local system. Things like delivery status have been centralized and the local system needs to follow this. All this makes the system look like a whole.

There is a template database made in order for new system to be implemented. This template includes all the links and agents that are needed in order to communicate with the order systems and the umbrella. The head of the application is also there. A new system can easily be made and a lot of work is saved. Another great feature with this template is that if it's decided to change the design or any other centralized part it needs only to be done at the template and all the other system receive the updates without any manual work. This has made the system maintenance much easier. Bugfixes and updates are also easily implemented.

4.4 Implementation - Face 4

There is two different parts of the implementation. The implementation of the organizational changes and the implementation of the IT support. The implementation of the organizational changes started by educating the local and central purchasers. They all needed to increase their skills but also to learn of the new organization and how it is suppose to work. The next step is to inform all the different departments and setting up policies about how the purchases should be done. The new organization started on a specific date but the whole organization didn't change on that day. This process runs over a longer time perspective. One important step in this implementation process is the internal marketing efforts. All the employees need to know what has happened and how they should go about ordering goods in the future. This is one of the more vital parts for success. The policies and rules are also important, but even more important is the accessibility of these. The employees need to know where to find them and they must be easy to find. The IT support is one greatly help in this aspect.

The implementation process for the IT system was of a more evolutionary type. They started the implementation in one department at a time, because they wanted to watch how the system reacted on so many users. It's also easier to correct small bugs and change features when it's not so many people involved. When implementing the IT system they had exhibitions showing the system and letting people try it. This was part of the marketing efforts in this process, but also one way to get input and whishes from the users. The implementation of the application will be done in several steps. They will release version1 and then continue with changing and adding features in preparation for release 2. The application is like a living organism that has to be cared for and at times learn new skills. After version 1 a lot of the resources dedicated to programming and testing have been freed.

The two implementation processes should not be looked at as single separated processes. They both need to be implemented at the same time and they have to work together. If one process runs ahead of the other it can mean failure for both the implementation processes. The implementation face is one of the pieces that Hässle has failed in before and therefore al lot of planning and resources have been put into these processes in order to make them successful. They are still implementing the purchase system as this is written.

4.4.1 Education Program

One of the important findings was the lack of competence and therefore an education program needs to be implemented. The program is divided into two main parts. The first is the purchaser competence and the other is the Working procedure / responsibilities

Purchasing competence

Need to know, understand and handle normal purchase terms
Offer contract handling
International purchase law
CE Marking
The juridical interpretation of Order, contract mm.
Evaluation of suppliers (Rating etc)
Handle suppliers, attitudes, and treatment etc
Supplier control, delivery and approval
Reclaim handling

Working procedure / responsibilities

Rules and policies
Rules when it comes to signing
The responsibilities of the different roles
Coordination between local and central purchasers
Competence demand on purchasers
The network
Coordination in the network and the group.
The acquisition process from start to end

4.4.2 Planned Effects from the Project

Certain positive effects have been estimated for the project and these are

- Lower prices
- Reduced costs for purchasing
- Reduced costs for handling deviations
- Improved delivery accuracy
- Focus on core business

The total reduced costs are estimated to 10 % of the total purchase value of 1 billion SEK. This is probably an underestimation of the potential.

4.5 Evaluation – Face 5

This is an important part of the project and parts of it have been done along the way. Each part has been evaluated separately and modifications and improvements have been written down and put in priority. Some improvements and new features like in the IT-System have been postponed to a later release. Some organizational problems were analyzed and changed if necessary. This has been done in order go gain greater control over the project but also because of the time. If changes are made without any stop the system will ”never” be implemented. When it comes to the IT- system the evaluations and test show

that people are quite satisfied with the proposed system. When it comes to response times and storage needs there were no specific goals at the beginning of the project but people seemed satisfied with the current times.

The final evaluation will be done out of the planned effects from the project. These five points are all quite easy to measure and in this way see if the project succeeded in its intention. Three of the planned effects deal with cost savings that show how much money the project has saved or earned.

The knowledge in the organization is another area where evaluation will be done. Here they measure if they have met the goals concerning the needs for knowledge. Have all the gaps been filled or is there still needs of competence that must be filled. The acceptance of the new organization will also be measured. This is not an easy part to measure but it will partly be measured out of the use of the IT support and interviews.

The final evaluation of the project has not been done yet but there are plans for doing this. The evaluation will then show if there is a need for even more changes or added focus on certain parts in order for the organization to achieve its goals. When is the project finished? Often it's not a goal line one passes but at times the project goes on forever or a clear stop is not defined. This project stops after the final evaluation. Further work will then be defined into a new project.

5 Discussion

The purpose of this report has been to show the purchase routines in a company and how they can be improved. I have also looked at the use and effects of workflow in the process both organizational and technical aspects have been taken into consideration. This has been done by looking at and being part of a project aimed at improving the purchase routines by centralizing and using IT. The report has shown that the purchase routines not always are as well organized as they could be. It has also shown the great need for greater control and efficiency in the routines. Time has shown to be a vital factor and therefore IT has been a great accomplisher for saving time. The discussion will be divided into three categories organizational, technical, and human.

5.1 Organizational

The different departments have their own needs when it comes to buying and selling. A lot of skill is needed in order to know all the local differences. To completely centralize this operation would be very difficult especially when things and needs change. The solution to this problem was to create a network of "Local purchaser". Every department established its own purchaser with a centralized purchaser to back them up in certain questions like legal matters. This, I think, is a very good way of solving the problem. You get the best out of both solutions. Global companies sometimes use this strategy. Local stores, global support network. This organizational form has shown to be quite fruitful. At Astra Hässle this helps to bridge the gap between the different departments and cultures. It also makes the purchaser stay with his people. The local

departments feel the support they need and the purchaser can easier ”feel the pulse” on what is needed.

The problem with a organizational form like this is that it can bring some clashes when it comes to who should decide what. Some feet could be stepped on. It’ s important then to have rules and guidelines as to who decides what. It also needs to be a spirit of cooperation between them.

For Astra Hässle this organizational change is quite a big change and there will evidently be some that might oppose the idea at first. The organization also needs to be educated to work in this new way. It’s difficult to learn an old dog to sit. This is one part that I think they need to be very aware of. At the moment of writing it doesn’t seem like they have filled in all the gaps on this point. Another important factor in order to get it to work is to show all the positive effects that the individual can gain at this. It’s also important that the people feel the value of the new organization and that it feels easier for them to work in it. I think the choice of making the purchase routines available to every person at his own desk is of great importance and I think this will be one of the things that will make the organizational change successful.
The purpose of the project was to streamline the process and make it more effective. The Workflow technology has some of Taylors thoughts about automating work and I think these thoughts clearly shine through in this project. The process consists of errands that have to go through several steps before they are completed. Sometimes there can be too many steps to go through and time could be saved by trying to make fewer stops. I think this has been done in this project by giving the local purchaser the authority and trust he needs to take most of the purchase decisions himself. Lower level managers have also been given greater trust by being able to sign for a greater sum of money. Big investment decisions go directly to the top and do not stop on the way. I think this greatly helps in making the process even more efficient.

Sometimes workflow systems can be seen as too rigid. It’s very difficult if not impossible to do something out of the ordinary. The information system to support the purchase process has this problem. It’s built to handle certain scenarios but if something happens that isn’t supported it doesn’t know what to do. I think this has been compensated with the use of the Local purchaser. Their job is to handle these cases ”the manual way” and help the users in the best way. The complexity of the process says that it’s ”impossible” to be able to support all the possible scenarios in one information system, this is sometimes forgotten but not in this case.

5.2 Technical

In order to bring the purchase system out to every employee at Astra Hässle the technical aspect was of great importance. Lotus Notes was chosen as a platform for development of a new user interface towards Prosit (the ”real” purchase system). As time went by there were a few limitations that obstructed the progress of the system. Lotus Notes was pushed to the limit. The user request came high up on the list. I think that the 80/20 rule should been a bit better implemented. The system at times tried to come up to 90 percent. The knowledge level about Lotus Notes was quite high but the knowledge was confined to a few people. This in mind the project was developed mostly by

consultants. Intranet is an already established infrastructure and that's why they decided to use this structure. I think it was a very good move. The technology is more widespread now than ever before and it's quite cheep and easy to use. The problem that they encountered was more of a user interaction problem. The users were familiar with client/server applications and could not always see the limitations in HTML technology. The most apparent challenge that both the users and developers once again faced was the static feel of HTML technology. The technology is always on the move and we can now hear about dynamic HTML pages and more tools for HTML interfaces. A lot has happened since the project started and the project was in the pioneering stage when it came to the use of such advanced applications as this. This made the project run out in time and cost. Lotus Notes has also evolved during the project which was positive at times. The question was always asked whether the cost of upgrading was worth the new features. It was shown that at least one upgrade should be done. This once again showed what happens when a project runs on in time in such a changing world. When the system is finished the technology is already old.

One of the risks with workflow technology is the inflexibility and at times lack of knowledge when it comes to workflow software. Lotus Notes was and still is the most flexible system, and a lot of consultant companies have gathered knowledge and experience about the product. Now the software Lotus Notes is about to be released in another major updated version, which would eliminate a lot of the problems encountered. One can always wait for something better but then nothing will probably get done.

The development of the applications took some time and is not yet fully implemented. This has several reasons. One is that they could not decide how the user interface and background structure should look like. The user interface was changed several times and at times the whole structure was questioned and at times changed. This boils down to some organizational problems that they have. They have problems taking decisions. It seems like they haven't though it through properly. There will always be changes but as many changes as was done to this applications is not normal in view. Some changes were done because of knowledge gained or new features implemented in Lotus Notes but a lot of the changes boiled down to pure organizational decisions. In my view they should implement a version and move many of the features wanted to a later release. The problem with this is that a certain level have to be gained in order for the users to fully use the program, but I still think that a lot of features could have been left out for future releases. It's ok to use this kind of prototyping thoughts if everyone is aware of it and if the time is set aside for it. This was not the case this time.

A decision was made to move the whole design to a template application. This I think was a very good move. It's easy to make changes to all the underlying applications and one only have to do the update at one place. This is great for new releases and bug fixes. The system was also divided into objects along the object orientation thoughts. This greatly reduced the development time and also made new features easier to implement. Astra Hässle has also been able to sell their template to other companies and in this way they have got back some of the development costs.

5.3 Human

This new organization and application creates great needs for change in the behavior of the employees. Astra Hässle has tried to change this behavior twice before without succeeding. I do not have enough knowledge about previous attempts to say what failed, but I think the current project has a great chance to succeed.

The employees have been involved in the project development from the beginning, this is a major success factor, and also an important step for eliminating one of the apparent risks with workflow systems ”the human aspect”(1.2.5). It makes the people feel a part of the project and they are more likely to take it to their heart. The application has been tested at different stages and they have been able to give their feedback and wishes. These whishes have been taken seriously and at times maybe too seriously and have been some cause for the delay of the implementation of the system (see previous section). The greatest problem I think will be that some people have to change their job routines. They might have liked the idea of checking around for different goods to find the right one just for them. Some might have felt some responsibility and now they are not as important any more. Buying goods and looking for the right sort might have been a change for them in their work. One positive aspect for smaller companies is that the employees are able to do a lot of different things, but in bigger companies this can at times be very costly and less effective. Job rotation can sometimes be a remedy to this problem, but because of the great knowledge in negotiation and legal matters that are necessary in order to do the job right I think that this is out of the question. Taken all the negative aspects into account I think the positive side weighs stronger.

Greater job satisfaction is one of the positive effects As I just mentioned one might find buying and selling goods satisfying but I suppose most people find it time consuming and at times boring if it’s not their ”real” job. This will now be a lot easier for them and they will find time for more interesting and satisfying work. The employer will also be happier because now the employees get more time over for what they really should do. Everyone will be happy because of the eliminated waiting time. As soon as the errand is finished at one part is goes automatically to the next part. After studding the process I know that there is allot of time to save. Just think of the time it takes to post a paper from one individual to another. Now the system handles this in just a wink of an eye. One does not forget to post it either. This also helps to increase the job satisfaction. The vice president of Volvo once said that Volvo should focus on what they were good at i.e. building cars and I think this is one of the thoughts that Astra Hässle now have implemented. People do what they are supposed to do.

I think one of the more vital parts for the projects to succeed is the paradigm shift that needs to be done in the organization. The report has shown great flaws in the knowledge when it comes to the purchasers’ role and also the knowledge needed by the purchasers. The purchaser’s knowledge has increased through education but the company has also recruited external professional purchasers. I think this is a good move, the organization has a lot of people that have been there for many years and when a paradigm shift is needed it can at times be good

to bring in a person with that paradigm. When it comes to how the organization views the purchasers I think the top management have to be more involved and show the way. They have already shown willingness to change but now they need to get that willingness to the rest of the organization, which at times has shown to be a great task. Astra Hässle has also been spoiled with a lot of resources and it requires a bit of change on that subject to. They now need to think of the future and be more effective in many ways. People need to radically change their behavior and that is often painful. They have already learned to use the computer in many of their activities and now they use it in one more. This can be a good thing because the learning degree is not so big due to the basic computer knowledge.

Another finding in the project was the need for Errand status. People like to know how far errands have come and also if there is a problem. This didn't exist but have been implemented in the computer system. This, I think, helps to satisfy people's curiosity and their feel of control. This also helps to unload part of the work burden and phone time of the purchasers. The Errand status is also a great example of the positive effects of workflow. It gives greater control over the errands by always knowing how far the process have come but I also think it's a great quality improvement. If something happens along the way one can easier find the problem and sort it out.
Implementation of the system is another important success factor. They chose the more evolutionary kind of implementation. This can help to get a more complete system out to the people. The bugs in the system only have to be detected by a few people and can be corrected quite fast. Another concern was the number of users and how it would affect the computer network. Would there be great delays? Would the server go down? Another factor in their favor is the curiosity and the jungle telegraph. If people like the system they tell others about it and they would like to have it to. I think that they should have had a bit more of revolutionary thinking. I miss the great bang effect. The system has not been really marketed and talked about. This should have been done I think especially because of the great delay in the system development. People have been waiting for the system and therefore they could have been put of by the great wait. This would have greatly helped the implementation.

Many of the positive effects of this project make the customer service a lot better. All the information needed is at your fingertips and if you have a question you always know who to call. This is just along the lines of what some of the workflow principles say.

6 Reference list

Medina-Mora, R., Winograd, T., Flores, R., and Flores, F. "The Action Workflow Approach to Workflow Management Technology." In Proceedings of CSCW'92, 1992.

Holm, P. & Ljungberg, J. Speech Acts on Trial. in Kyng and Mathiassen (eds) Computers and Design in Context. Cambrideg, Massachussets: MITpress.

Ljungberg, J. Workflow Management State of the Art, SISU Publication 96:21

Frontec, The Five Stages and The Four Rings, A Frontec Publication

Backman, J. (1985) Att skriva och läsa vetenskapliga rapporter, Lund: Studenlitteratur