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Analysing and Reengineering the Order Process at Noblessa Sverige AB - A pre-study for an ERP system implementation

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Sammanfattning
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The purpose of this master s thesis is to analyse and reengineer the order process as a preparation for an ERP system implementation. The outcome of this thesis is a suggestion of a process model of the order process, which also can be used as a foundation for a requirements specification for the ERP system purchase. In order to take advantage of the benefits of the existing order process, the reengineering starts with mapping the current process.

Noblessa Sverige AB is a company that is growing and changing from one day to another. Changes have arisen during the writing of this thesis which has made the work even more interesting and challenging. The most important change is the opening of a central warehouse in Norrköping, which has been taken in consideration when we designed the new process model.

After mapping and achieving an understanding of the current order process, we found a few things that could be improved. Above all, there exist many manual tasks that can be automated with the ERP system. Furthermore, there are tasks that should be moved from one department or function to another because it is more suitable to perform them there. We also found that Noblessa Sverige AB should improve the integration and cooperation with its suppliers, especially Nobilia. Nobilia is the main owner and main supplier of Noblessa Sverige AB, the conditions for cooperation are therefore very good.

Nyckelord
Keyword

Noblessa, Business Process Reengineering, Enterprise Resource Planning, process improvement, order process, process mapping

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ANALYSING AND REENGINEERING THE ORDER PROCESS AT NOBLESSA SVERIGE AB

A PRE-STUDY FOR AN ERP SYSTEM IMPLEMENTATION

PETER BLOMQUIST
&
FRANZ WYGLER

Preface

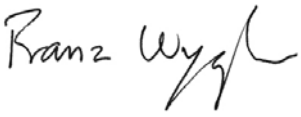
This master's thesis is the outcome of 20 dark, cold and snowy Swedish weeks of hard work, from November 2005 until May 2006. The thesis was performed at Noblessa Sverige AB in Norrköping and is a preparation of the order process for an ERP system implementation.

We, the authors, could never have reached this achievement without the help that we have received along the way. First of all, we would like to thank Andreas Jonsson, our supervisor at Noblessa Sverige AB. Even though he has been very busy with his own work, he has always been there for us guiding us along the way and discussing ideas.

We would also like to thank the employees at Noblessa Sverige AB who have gladly been interviewed and answered our questions. Furthermore, we want to thank Nobilia and its employees for the friendly reception in Germany. The tour of the plant was very interesting and your answers to our questions have helped us a lot. A special thanks to Philipp Naumann who received us, guided us and helped us to gather information at Nobilia.

Last but not least, we would like to thank our supervisor Anders Gustafson and our examiner Martin Rudberg from the Linköping Institute of Technology. Your help and interest in our work have inspired and encouraged us to achieve this result.

Linköping, May 2006



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Abstract

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Glossary

AutoCAD	A CAD supplier
BPR	Business Process Reengineering
Briljant	Accounting software
BSH	Bosch Siemens Hushåll, one of Noblessa's suppliers
Business process	A process within a company
CAD	Computer Aided Design, drawing software
COE	CAD Order Entry - AutoCAD based software developed by Nobilia
E-commerce	Electronic commerce, for instance EDI or Web-EDI
EDI	Electronic Data Interchange, a system for transferring information electronically between companies
ERP	Enterprise Resource Planning, a business comprehensive information system
IS	Information System
IT	Information Technology
OPD	Noblessa's Order Processing Department
SCM	Supply Chain Management
Supply chain process	A process throughout the supply chain
Winner	CAD software specially developed for drawing kitchens
Web-EDI	An EDI link between companies where the customer enters information in a form on a webpage which is in direct contact with the supplier's information system

1 Introduction

This first chapter is an introduction to the subject and the problem area that we, the authors, aim to study. Initially, we present a background to the study followed by a discussion of the problem. Then, we state the purpose and delimitations of the study and finally we present the outline of this thesis.

1.1 Background

In the middle of the 18th century the Scottish professor Adam Smith performed a study of a pin producing factory, the result was published in the first chapter of his book "An inquiry into the nature and causes of the wealth of nations". The ten workers in the factory each performed every task necessary for making a pin, from straightening the wire until sharpening it, altogether 18 tasks. The daily production of one worker was on a good day 20 pins, but could just as well be only one pin per day. Thus, on a perfect day, the factory could produce 200 pins. Smith divided the 18 tasks into ten different moments, giving each worker one, two or three tasks to specialise in. This increased the daily production to almost 50000 pins. (Smith, 1976)

The discovery of the advantage with specialised work was one of the fundamental forces behind the industrial revolution. The thoughts of Smith were refined and used by Henry Ford, among others. Ford's statement: "You can have your Ford in any colour you like, as long as it is black" set the standard for mass production. The customer had to buy the available product, offering customer customisation was unusual. (Willoch, 1994)

The conditions changed sometimes during the 1970s when the customers started demanding quality, variation and customisation. The number of suppliers was growing dramatically and the customers became more and more willing to change supplier. This brought problem to most businesses, because up until now the productivity and not the customer had been focused and the organisational structure was not adapted for this new demanding customer. Ever since the industrial revolution almost every business had been functionally structured with a hierarchical organisation, this new era required something else. (Ibid.)

The answer to these new conditions was to focus the company's business processes, but this was no new understanding. In fact, as early as during the 1930s, Shewhart

presented his idea that high quality products came from managing the business processes and not from a meticulous control of the finished products. Nevertheless, it was not until the 1980s that focusing, reengineering and improving the business processes got generally acknowledged, with the demanding customer that entered in the 1970s as catalyst. (Rentzhog, 1998; Sharp & McDermott, 2001)

Focusing processes was the answer to the new demanding customer, but another important help for companies trying to improve their business was the introduction of information technology and information systems. Actually, focusing business processes and information systems are linked together since the implementation of an information system became, and is yet today, a great stimulus for companies to reengineer and improve their processes. The roots of the information systems of today can be traced back to the 1960s or early 1970s, but it was not until the 1990s that process orientation became the starting point for how to design the system. Today, the purpose of an information system is to make the business processes more effective by using information technology in an effective way. (Magnusson & Olsson, 2005)

One of the first information systems was MRP (Materials Requirements Planning) which was introduced during the 1970s. These first information systems were designed only to support the production function of the car manufacturing industry. The need for more system support for other functions of the company resulted in more advanced systems and in the 1990s almost every part of the organisation had its separate information system. The problem was the lack of integration between the different systems. This caused the creation of a “super system” based on modules, where the modules could be added or deleted as required. For instance, if the customer did not need a financial control module it would be deleted. This system was called Enterprise Resource Planning System (ERP) and is a standardised, business comprehensive, support system. (Ibid.)

Noblessa Sverige AB, henceforth referred to as Noblessa, is a sales company to the German kitchen producer Nobilia. Noblessa has been growing remarkably since the start in 2001 and the forecasts shows that the sales volume will continue increasing in the future. In order to be able to handle the increasing sales volume, Noblessa wants to have the order process analysed and improved. There have also been discussions about a purchase of an ERP system. An implementation of an ERP system could facilitate the tasks of the order process and improve it even more.

1.2 Problem discussion

As discussed above, Noblessa has been growing remarkably since the start 2001 and the turnover has at least been doubled every year. By the end of 2005 Noblessa has six own stores, one retailer and a calculated market share of 2 percent of the Swedish market. The goal is to have seventeen stores, including retailers, and 10 percent of the Swedish market within 5 years.

The fast growth of any company inevitable brings problems, and not just positive effects. This is the case for Noblessa as well. One example is the order process which is not adjusted to the sales volume of today, it brings a lot of paper work and manual tasks to the employees.

A web-based order handling system on Noblessa's Intranet, called NOOS, has been developed as a temporary solution, but this is not enough to handle the sales volume given by the goal of a 10 percent market share. Therefore, Noblessa wants to have the order process analysed, reengineered and improved as a preparation for an ERP system implementation.

1.3 Purpose

This thesis aims to design a process model of the order process at Noblessa Sverige AB. The process model has to be designed so it is able to manage the expected expansion that Noblessa is facing. Furthermore, the process model has to take the use of an ERP system in consideration and it will also function as a foundation for a requirements specification for the ERP system purchase.

1.4 Delimitations

This thesis treats the order process at Noblessa; from receiving a customer order at the sales department until the order is closed and filed. The order is closed after the kitchen is delivered to, and in some cases fitted at, the customer. The order process at the production company Nobilia will be taken in consideration to include eventual economies of scale and synergy effects. However, Nobilia's order process is assumed to run without problems and the products are delivered on time.

Since Nobilia is the main supplier, with 75 percent of the value of the delivered products, the other suppliers will not be included to the same extent. They will be kept

in mind when designing the process model, but since this is the result of a thesis preformed in 20 weeks the time is not enough for interviews and field studies at the other suppliers.

1.5 Thesis outline

The first two chapters of this thesis, **Introduction** and **Company presentation**, give the reader an understanding of Noblessa and Nobilia, the problem background and the purpose of this thesis. We recommend these two chapters if the reader is not already familiar with Noblessa and its situation.

The third chapter, **Methodology**, is a presentation of the scientific approach and data gathering methods used by the authors. This chapter is not necessary to read unless the reader wants a deeper understanding of the methodology of this thesis.

For the reader who desires knowledge of ERP systems and methods for improving processes, we recommend the chapter **Frame of reference**. This chapter, the fourth one, gives the underlying theory for the thesis.

The fifth chapter, **Noblessa's current order process**, gives the reader an understanding of the current workflow and actors, and chapter 6, **Analysis of the current order process**, is a discussion of some of the things that could be improved We recommend these chapters if the reader is interested in the current order process and its problems and improvement possibilities.

The following two chapters, **Process model for Noblessa's new order process** and **Conclusions and recommendations**, are the outcome of this thesis. The seventh chapter presents the workflow of the new process model and the involved actors, whilst chapter 8 gives further recommendations of what Noblessa has to do in order to make the process reengineering and ERP system implementation possible. The eighth chapter also contains recommendations of how to further improve Noblessa's business. Finally, the references for this thesis are presented under the chapter **References**.

2 Company presentation

In this chapter we present Noblessa and Nobilia. The presentation is based on interviews with the managing director, Pontus Molander, and the head of logistics, Andreas Jonsson. Furthermore, information was gathered during a field study at Nobilia's plant in Germany and interviews with employees of Nobilia. Internal data from Noblessa and Nobilia was also used.

2.1 History

The idea to sell kitchens was born in the latter part of the year 2000. In December that year the present managing director, Pontus Molander, and the present chairman of the board, Staffan Tunbrå, went down to the German kitchen producer Nobilia in the small town Verl. The factory, located about two hours by car northeast of Düsseldorf, with its flexible production and high productivity impressed, and to work with Nobilia as a partner was a matter of course.

Nobilia created the name Noblessa for its export market and in April 2001 the company Noblessa Sverige AB was founded by Pontus Molander. The first shop was located in Norrköping and due to the success of the business a second shop located in Bromma was opened in 2002. The business kept growing and the turnover 2002 was doubled compared to the first year. The following years followed the same path and new shops were opened in Gävle, Uppsala and Falköping. However, the shop in Gävle is not owned by Noblessa, but by the retailer Nordek AB.

In 2004 Noblessa decided to open a shop in Arninge, outside Stockholm. It was opened in January 2005 and it has, with its 55 kitchen, the biggest kitchen exhibition in Scandinavia. The shop in Arninge has been a success and is a contributing reason to the growth of Noblessa. In 2005, Noblessa's turnover was 120 million SEK, which is almost three times the turnover of 2004. In December 2005 a shop in Malmö was opened, the last so far.

The success of Noblessa has not passed Nobilia unnoticed, and the German company wanted to learn more about the Swedish kitchen market. At the same time Noblessa needed better financial support and because of these reasons Nobilia bought 85 percent of the shares in Noblessa in April 2004. Nobilia, however, does not inflict its power over Noblessa, they know that their strength is producing kitchen and leave the

decision making of Noblessa to Noblessa. The organisational chart of Noblessa, with Nobilia in the top, is presented in Figure 2.1.

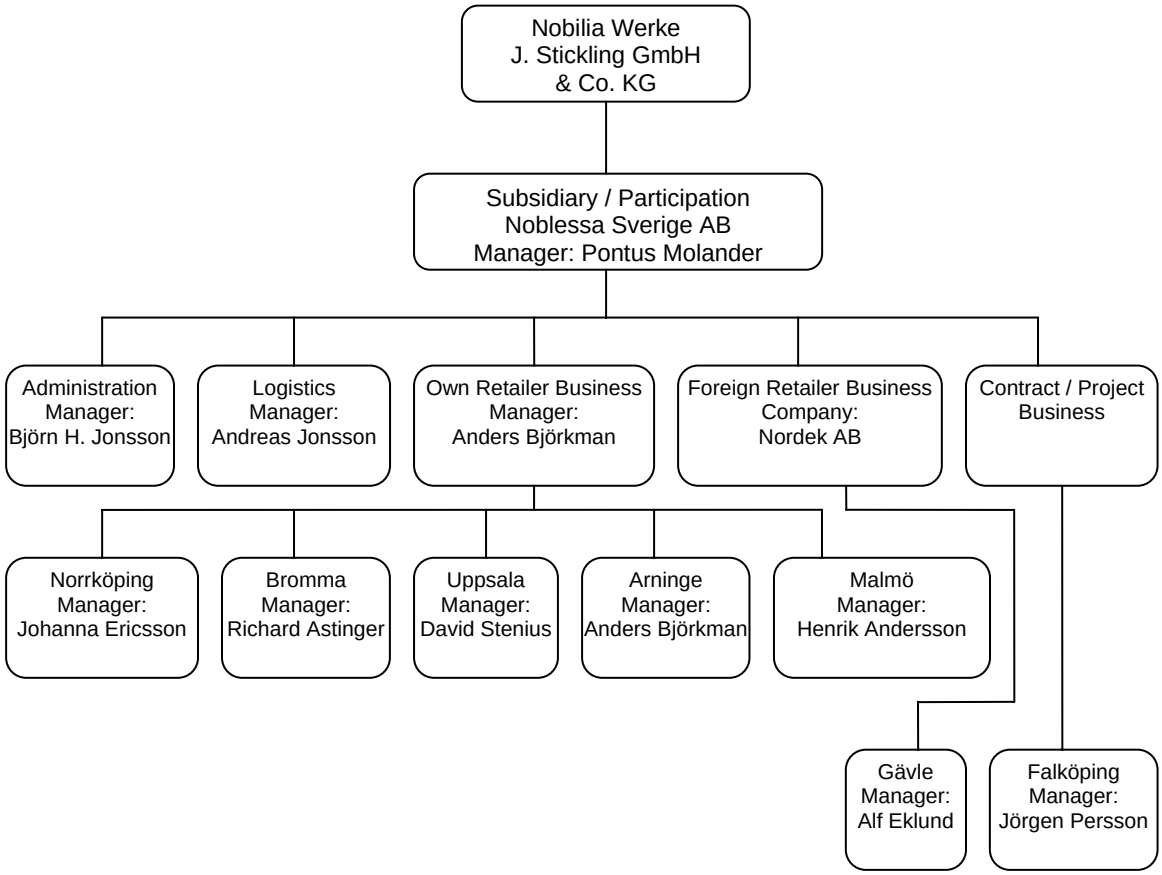


Figure 2.1: The organisational chart of Noblessa.

To be able to manage the logistics more effectively, Noblessa opened a central warehouse in Norrköping in February 2006. This site, called the Logistics and Administration Centre, does not only have the function as a stock. This is also where the Order Processing Department, the Finance and Accounting Department, and the managing director is located. Before the central warehouse was opened, the shops in Norrköping, Malmö, Falköping and Gävle had their own local stocks and a warehouse in Arninge provided the goods for the shops in Arninge, Bromma and Uppsala. The new warehouse in Norrköping has replaced all these local stocks, except at the shop in Malmö and at the retailer in Gävle. Up until now, the central warehouse has only been used as a merge in transit point. In other words, the products stay in the warehouse only until all suppliers have delivered their goods and the order is complete. But in the future, the warehouse will also keep stocked products. These stock-keeping units are mainly small, simple and cheap details, e.g. handles for cabinets.

2.2 Today

Noblessa market itself as *Sweden's New Kitchen* and their business concept is to offer a complete kitchen, including fitting in the customer's home, to a reasonable price. Nobilia has been the main supplier since the start, but the customer demand for products that Nobilia does not deliver, e.g. worktop of granite, forced Noblessa to seek other suppliers as well. Nobilia is still the largest supplier with roughly 75 percent of the delivered value. Besides Nobilia, Noblessa has approximately 20 additional suppliers.

Noblessa differentiate themselves from their competitors by offering fitting of the kitchen in the customer's home. The fitting task is hard to plan and synchronise with the other tasks in the order process. Therefore, there have been discussions about abandoning the fitting offering, but the customer demand for fitted kitchens is too significant to disregard.

Another difference is that compared to its competitors Noblessa can offer a wide spectrum of variants and the kitchen can be adapted to the customer's requests at a high level without the prices hitting the ceiling. This wide spectrum of variants, and still a reasonable price, can be offered due to the flexible production of Nobilia.

Noblessa direct themselves to 80 percent of the Swedish market, the target group is the middle 80 percents seen from a purchasing power perspective. The top and the lowest 10 percents are not included. Besides selling to private customers Noblessa also sells to building projects, e.g. new apartment buildings or when renovating old buildings. This is mainly done from the shop in Falköping and this is seen as a coming market which will be pursued in the future.

One important way of marketing for Noblessa is old customers recommending the company to friends and family, i.e. potential customers, thus satisfied customers are of great importance. Complaints with damaged goods and badly fitted kitchens can be a lot more expensive than just the cost of fixing the complaints. Another problem is when the customer gives the wrong measurements of the kitchen. This is obviously the customer's fault but will yet affect Noblessa by expensive additional orders and dissatisfied customers. To prevent this from happening Noblessa has, in Stockholm, begun to send its fitters out to the customers to measure the kitchen.

Today Noblessa has six own shops plus the retailer in Gävle. The turnover of 2005 was 120 million SEK, compared to a little more than 5 million SEK in 2001. The market share is estimated to 2 percent of the Swedish market and Noblessa has roughly 50 employees.

2.3 Future

The eyes are always open for suitable locations to locate new shops. The plan is to open two more shops in 2006, one own shop in Västerås and one retailer shop in Västervik. The ideal spot is not in the middle of the city, but a cheap and visible location with parking lots. As said before, the goal is to have 17 shops, including retailers and 10 percent of the Swedish market within five years.

2.4 Nobilia

The main owner and main supplier Nobilia is a family owned company founded in 1945. Nobilia has the largest kitchen producing factory in Europe with a daily production of 1500 kitchens, more or less the same quantity of kitchens sold by Noblessa during a whole year. Noblessa's sales volume is approximately 2 percent of Nobilia's export volume. 25 percent of Nobilia's produced volume is for the export market which means that 0.5 percent of their produced volume goes to Noblessa. The yearly production is approximately 300 000 kitchens and in 2004 the turnover was € 482 million. Nobilia has today only one production unit located in Verl, Germany, with approximately 1500 employees. However, a second factory with the same capacity is under construction close to the present one.

Nobilia never have any contact directly with the end customer and most kitchens are sold through retailers. The exceptions are sales companies like Noblessa and big building projects. There are only two sales companies and Noblessa is one of them, the other one is located in Great Britain.

The production has a lead-time of three to four weeks, from receiving an order until the kitchen is produced. The flexible production makes the manufacturing of every customer specified order possible, and the high level of automation pushes the unit price down. Nobilia has an agreement with Siemens and other suppliers of white goods and Noblessa can buy white goods via Nobilia.

The strength of Nobilia is to deliver a complete, customised kitchen, hardly ever with defects. Nobilia loads the finished kitchen on its own trailers, which are driven to the customer or Noblessa’s warehouse. This way reloading is almost completely avoided, which is good since reloading sometimes generates damaged goods. The kitchens are prefabricated, in other words the cabinets and other products are not delivered in flat packages, they are assembled already at the factory. This makes the fitting at the customer easy and fast.

3 Methodology

In this chapter we introduce the methodology relevant for this thesis. First the scientific approach and objectivity are discussed, followed by a comparison between different information collection methods. The last theory presented is concerning validity and reliability. Finally we present our chosen approach and methods and a critical review of them.

3.1 Scientific approach

Researchers try to produce theories that present the best possible knowledge of reality. The empirical data is the information about the reality being studied, i.e. the foundation of the theory construction. To relate this empirical data to theory is one of the central problems in all scientific work. Patel and Davidson (2003) present three ways to tackle this:

- Deduction
- Induction
- Abduction

These are the main ways of performing a study, and they will now be further discussed.

3.1.1 Deduction

The first method, deduction, follows the path of evidences. From existing theory hypotheses are derived and then tested empirically. The objectivity is said to be strong since the starting point is taken from existing theory and hence less coloured by the subjective opinion of the researcher. On the other hand, the existing theory might affect and direct the researcher so that no new findings will be found. (Patel & Davidson, 2003)

3.1.2 Induction

When performing a deductive study the theory is the starting point and the empirical analysis the end point. Induction is the opposite; from empirical facts general conclusions are drawn and theories constructed. In other words, the starting point is

the gathering of information, the observations, without any theoretical support. From these observations new theory is created. (Thurén, 1991)

The idea is for the researcher to discover something that can be formulated in a theory. Nevertheless, a conclusion from an inductive study is only a 100 percent valid for the group of people, time or situation of the empirical study. It is therefore hard to generalise it. Another difference from deduction is the level of objectivity. In an inductive study the researcher's ideas and notions will affect the result at a much higher level. (Patel & Davidson, 2003)

3.1.3 Abduction

The third approach abduction can be described as a combination of the first two, deduction and induction. Abduction begins with a theory being created in the inductive way, followed by testing this theory deductively. The risk of the researcher being locked in a way of thinking, which might happen in deductive and inductive studies, is reduced this way. The disadvantage is that it demands a lot from the researcher. If he or she is not broad-minded enough, hypothetical theory might be validated deductively. (Patel & Davidson, 2003)

Alvesson and Sköldberg (1993) argue that deduction and induction should be seen as something that unnaturally has been broken out from abduction. They maintain that the advantage of abduction is that it gathers the best qualities from deduction and induction. The differences and similarities between deduction, induction and abduction are shown in Figure 3.1.

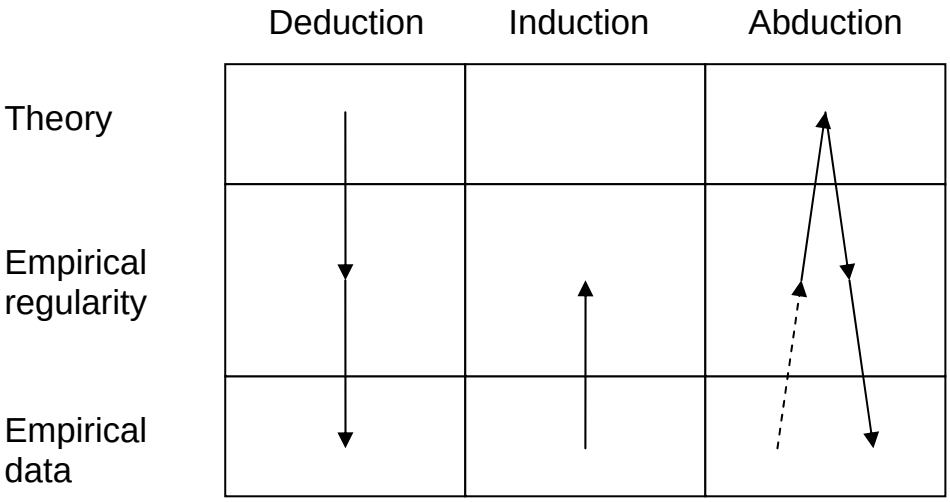


Figure 3.1: Deduction, induction and abduction. (Alvesson & Sköldberg, 1994)

3.2 Objectivity

There are differences in opinion on how a research should be conducted to be scientific, i.e. if a study should be deduction, induction or abduction. The big difference in opinion is whether a researcher can be, or should be, objective, and not let personal values and experience interfere with the study. (Remenyi et al., 1998)

Objectivity can be described as presenting data without biases or leaving out information, i.e. separating facts from values. There are three main standpoints regarding the relation between values and facts. The first one is that absolute objectivity is achievable and should be strived for. The second is that absolute objectivity is not possible to obtain, the researcher should however present his or hers assumptions and perspective so that the reader knows the researchers starting point. The third one, deliberate subjectivity, is based on the thought that it is impossible to separate the subjective from the objective. This last standpoint is only used in social science. (Lundahl & Skärvad, 1999)

A way of testing objectivity is presented by Føllesdal et al. (2001). When leaving out information the researcher should ask him- or herself: Would the reader's opinion or attitude about the description change if the left-out information were included? If the answer is no the description is objective, in the other case, objectivity is not obtained and its flaws should be revised. Føllesdal et al. (2001) also stresses that the use of emotionally charged words should be avoided to achieve objectivity since they might cause alternative descriptions that changes the attitude of the reader.

3.3 Collecting empirical data

There are two types of empirical data, primary and secondary data. Patel and Davidson (2003) refer to primary data as *eyewitness description* or *first hand reporting*, which gives a good idea what primary data in fact is. Primary data is information collected by the researcher within the timeframe of the project, e.g. a protocol from a meeting, an interview, an observation or a questionnaire. (Lundahl & Skärvad, 1999; Bell, 2000)

Secondary data is information relevant for the study that has already been collected, e.g. by other researchers or by the same researcher but for another study. Examples of secondary data are books, annual reports, TV-shows or data collected from the Internet. Available secondary data should be used since the researcher is spared the

trouble of collecting the information. It has to be used with caution though, as with all collected data. It is important to secure the secondary data's validity, reliability and relevance in proportion to the study's purpose and problem description. (Ibid.)

Hereby follows a presentation of two techniques for gathering primary data, interviews and observations, and one for gathering secondary data, document review.

3.3.1 Interviews

An interview is a technique that builds its collection of information on the interviewer's ability of asking questions or starting a dialog with the interviewee. Most interviews are done face to face with the interviewee, but they can also be performed by phone. The advantage of an interview is its flexibility. A trained interviewer is able to follow up ideas and emotions, which is not possible in a questionnaire. Furthermore, how a response is given, tone, mimicry and pauses can give information that a written answer does not reveal. (Lundahl & Skärvad, 1999; Bell, 2000; Patel & Davidson, 2003)

Interviews can differ in terms of standardisation and structure. A standardised interview does not leave room for the interviewer to change the question design or their relative order, and a structured interview does not leave much freedom for the interviewee to float away when answering the questions. A fully standardised interview is when the interviewer reads a questionnaire to the interviewee, and a fully structured interview is when all the questions have predetermined alternatives for the interviewee to choose the answer from. (Ibid.)

3.3.2 Observations

For everyday use observations are the major way for acquire information of the surrounding world. We do this more or less without thinking of it. Observation is also a scientific technique for collecting information. Observations are used especially when behaviour and events in natural situations are observed, and it is often used to complement information achieved from other methods. An advantage with the observation method is that it is relatively independent of the individual's willingness to give away information. However, the observer might influence the studied person and his or hers way of thinking and acting just by being present. This can lead to abnormal behaviour of the observed person. To avoid this problem the observer has to be a part of the observed system. (Patel & Davidson, 2003)

Observations can be realised in different ways. The first method, structured observation, is to decide what to observe in advance, i.e. structure the observation in terms of how it shall be described, measured etc. The second method is the opposite, unstructured observation. No premeditate observation schedule is used in this method and the observation is more adapted to the situation. The two methods can be combined: besides observing what was decided ahead, eyes are kept opened for interesting and important information that has not been taken in consideration before. (Lundahl & Skärvad, 1999; Patel & Davidson, 2003)

3.3.3 Document review

Traditionally the word document refers to written or printed information. Nowadays information can be stored in different ways as well; films, photos and sound recording et cetera. The selected documents should give the most complete view as possible, i.e. they should shed light on all sides of the investigated area. The selection of document has to begin with a critical evaluation of the sources. When and where were they made, and more importantly, why? What was the writer's purpose? What was the situation at the time? And finally, what was the writer's relation to the event? (Patel & Davidson, 2003)

It is important to not only collect material that supports the ideas of the researcher. This might give a false impression of an occurrence or an event. A researcher can prove anything, broadly speaking, just by choosing facts that support what he or she wants to prove. The researcher should also present and discuss facts that contradict the result. (Ibid.)

3.4 Validity and reliability

Whatever method is used for the gathering of information, it has to be critically examined in order to determine if the achieved information is reliable and valid. If a study is performed a number of times with the same result, it is reliable. If the result concurs with reality, the study is valid. (Bell, 2000)

Merriam (1994) presents the following six strategies for ensuring the validity of the study:

1. *Triangulation*, that is to use many different sources of information and methods to confirm the results.
2. *Control by participants*. The interviewees and other human sources of information check the interpretations of the researcher to see if they are trustworthy.
3. Observation during *a long period of time* or *repeated observations* of the same phenomenon.
4. "*Horizontal*" *evaluation and criticism*, i.e. colleagues giving comments on the achieved result.
5. The persons being studied participate in every phase of the study, from establishing concept till designing the final report.
6. *Explaining the previous knowledge* of the researcher that might interfere with the study, e.g. manifest starting point, assumptions and theoretical perspective etc.

To ensure reliability the following three techniques are presented by Goetz and LeCompte (1984):

1. *The researcher's position*. The researcher explains the underlying assumptions and theories for the research, his or hers perspective of the group being studied, the criteria for choosing sources and the social context where the information is collected from.
2. *Triangulation*. As well as for validity, triangulation can be used for ensuring reliability.
3. *"To follow the same path"*. The researcher has to describe his or hers methods so that other researchers can use the report as a user's guide to repeat or replicate the study.

3.5 Our choice of approach and methods

Our conviction is that our previous knowledge is an important asset when solving problems during the way, thus induction or abduction are closer at hand. Abduction is more suitable for this thesis since we have to go back and fourth between theory and

empirical data, e.g. the new process model is created from the current order process via theory.

However, we strive to be as objective as possible when writing this report, but as mentioned before, it is practically impossible to be totally objective. We use the question presented by Føllesdal et al. (2001) to test our objectivity when leaving out information, and we avoid emotionally charged words.

Empirical information about the current order process is collected by interviews, observations and reviewing existing documents and literature. The interviews are standardised to a certain level but always free; i.e. the interviewer has the freedom to ask additional questions if needed and the interviewee is not given predetermined alternatives to choose from when responding. The interviewee has the liberty to wander off the topic so that other interesting perspectives are achieved as well. The observations are a combination of structured and unstructured, i.e. they are prepared but our eyes are opened for other important information as well. Internal data from Noblessa and Nobilia is also reviewed and knowledge will be acquired from relevant literature.

In order to ensure validity and reliability we follow some of the strategies and techniques given by Merriam (1994) and Goetz and LeCompte (1984).

- Triangulation is achieved by using several different sources of data.
- Interpretations from interviews and observations are sent back to the interviewee or the person being observed so he or she can review it and point out any doubtfulness.
- Our supervisors at Linköping Institute of Technology and at Noblessa review this study.
- We intent to describe our methods and discussions as detailed as necessary so the reader can follow our line of thought.

We argue that the strategies and techniques that we do not follow are either impossible to follow or irrelevant for this study.

3.5.1 Critical review of chosen approach and methods

That the choice of approach and methods is *our* choice is the principal criticism that could be directed to us. There is a risk that we have unintentionally neglected an alternative approach or perspective that might have been more appropriate for the study. Our experiences from writing reports and performing studies in the past might inflict us to choose the methods we are used to but not appropriate this time.

Nevertheless, we have thoroughly discussed the theory and the chosen approach and methods and we do think that the choice is the most appropriate for this study.

4 Frame of reference

In this chapter we present the theoretical foundation for this thesis. Initially, we explain ERP systems and discuss their possibilities and limitations as well as how communication between two companies' ERP systems can be performed. Then, we introduce the concept Business Process Reengineering and other methods for improving processes, within a company as well as within the whole supply chain. Thereafter, we discuss methods for mapping a process and finally we present our choice of methods.

4.1 Enterprise Resource Planning

The trend the last decades is that information has become more and more critical for the whole society. Many observers and commentators have proclaimed this to be the dawning of a new era, known as the information society. This new era is characterised by the increased use of information and various methods for processing it.

The roots for the information society can be traced back to the introduction of information technology and information systems to the business world. Over the years, the methods and the support systems for processing information have become more and more advanced. During the 1990s, information systems that can integrate all the different business areas were developed, these systems were given the name Enterprise Resource Planning (ERP) systems. Today, the vast majority of the bigger companies have an ERP system to support their processes, and a lot of different ERP system providers exist on the market. The most commonly known ERP supplier is probably the German company SAP. (Magnusson & Olsson, 2005)

ERP systems are, as explained in the first chapter, business comprehensive support systems that are standardised to the extent that they cover almost every business process that a business might have. ERP systems are based on modules that can be added or deleted as required, which means that the ERP systems can be adapted to practically any company. These modules might be anything from finance control modules to production management modules. The difference from a separate information system that supports only one business area is that the modules communicate with one another, thus providing conditions for an overall control of the business and making information more accessible. The fact that the system is built up of underlying modules creates good conditions for companies to expand their business,

a new module that covers the wanted area can be quickly added and the system is adjusted to deliver a new functionality. (Ibid.)

As can be seen in Figure 4.1, the software and data storage is centralised in an ERP system. There are many advantages with this structure. Mainly, these advantages involve the reliability that comes with single entry, i.e. that the data is stored only at one place in the data base. Concerning the global setup of data definitions and the use of the same data structure, ERP systems are especially useful for organisations that are spread out globally. (Ibid.)

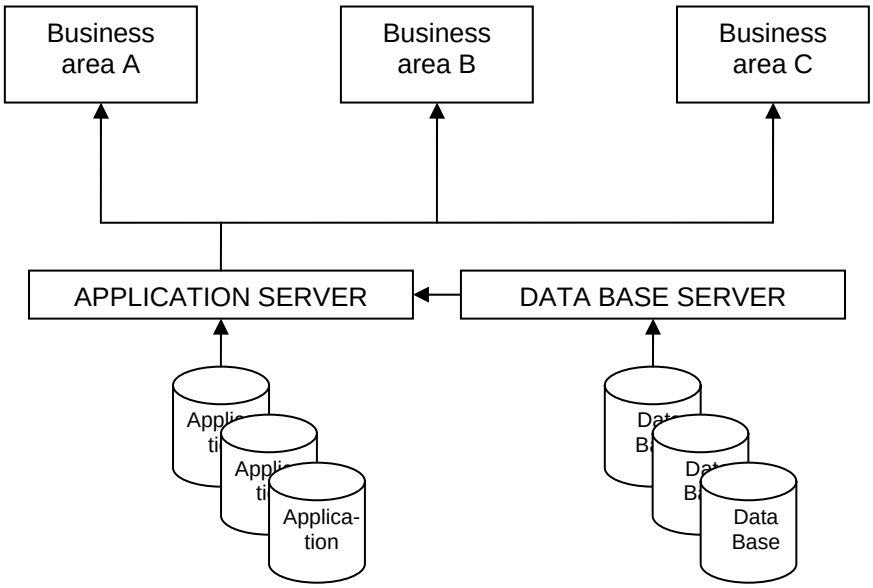


Figure 4.1: A schematic sketch of the basic structure of an ERP system. (Magnusson & Olsson, 2005)

4.1.1 Advantages and disadvantages of ERP

There are many "war stories" of how an ERP implementation has helped companies achieve a substantial business gain. On the other hand, many companies have had trouble with the implementation, the cost exceeded the budget and the project was much more time-consuming than expected. It is important to look at both the negative and positive effects that an ERP system might bring, before making a decision to implement one or not. We will not treat all benefits, risks, advantages and disadvantages with ERP since that is not the main purpose of this thesis. However, we will present a few in order to give the reader a perspective of this.

The principal reason to implement an ERP system is probably to integrate the business' information flow. If the information flow is integrated, two employees do

not have to enter the same data in two different places, which means that less work is needed. It will also shorten unnecessary long lead times that might exist, thus shortening the total lead time. Worth mentioning is that during the 1990s, IBM succeeded to lower the lead time of setting new prices on their products from 5 days to 5 minutes. Before the ERP implementation, they had to enter the new prices in all the separate information systems, now this information only had to be entered at one place. Another advantage is more effective processes. By adapting the business to the system, a streamlined process structure is achieved that do not have unnecessary waiting times since the planning of the processes is improved. Better control with accessible information from the whole business is another benefit as well as lower running costs. (Jacobs & Whybark, 2000; Magnusson & Olsson, 2005)

However, as often when the benefits are many and considerable, so are the risks as well. The financial risk concerns the huge commitment that an ERP implementation is. Some researchers claim that the cost of implementing an ERP system is 2-10 % of the business' turnover. Furthermore, the implementation might be very time-consuming and it happens that the business loses the ability to act while implementing the new system. An example is Hewlett-Packard that in 2002 began implementing an ERP system on order to consolidate 250 different systems. The budget was 110 million dollars and the goal was to implement it within three years. In 2005, the project was delayed 2 years and losses of 160 million dollars had been reported due to the difficulties to act during the implementation. Of course, risks and potential problems are much more obvious when implementing the system into a big company that already has a lot of different, separate information systems. (Langenwalter, 2000; Magnusson & Olsson, 2005)

Another risk comes with the fact that a company's ERP system is delivered by a single supplier. The customer can not count on the supplier's competitors to deliver the needed support or modules. The risk is that the supplier might decide to raise the prices more than expected or, in worst case, stop providing support for the system. Furthermore, the customer often underestimates how critical the ERP system will become for its future business. The customer often see the ERP system as another information system investment, when in fact it is a fundamental part of the business' foundation and to change ERP system or to stop using it is practically impossible. (Magnusson & Olsson, 2005)

To summarise, implementing an ERP system is no walk in the park. The risks have to be considered and given respect. On the other hand, the benefits and potential gains with an ERP system are huge and many companies have implemented a system without major problems. If the company is well prepared, the implementation is carefully planned and the employees are behind it, the chance of failure is low.

4.1.2 ERP systems in supply chains

In rare cases, companies have included their customers and suppliers in their ERP system. But more commonly is that the companies' ERP systems can communicate directly with each other using E-commerce, with little or no human involvement. E-commerce means "electronic commerce" and involves moving data between companies electronically rather than using fax or phone. (Langenwalter, 2000)

Of all methods for performing E-Commerce, Electronic Data Interchange (EDI) is considered to have the biggest potential for savings and improvements. EDI is a technique that uses standardised electronic documents to transfer data from one company to another. For two systems to understand each other they have to use the same standard. EDI is mostly used between companies that have a regular and repeating exchange of structured information, and it is above all useful when frequently exchanging large amounts of information. (Fredholm, 2002; Mattsson, 2002)

To create conditions for companies to communicate more effectively with small customers and suppliers, solutions that are a combination of EDI and the Internet have been developed. These solutions are sometimes referred to as web-EDI. The small company only needs a web browser to open and fill out an electronic form, which the ERP system of the bigger company is in direct contact with. (Ibid.)

A technique of communicating electronically, but not in a digital way, is fax. This is essentially a paper based system that has been an important means of communication, but is getting replaced more and more by E-commerce like EDI. When sending a fax, the sender prints a paper and sends it and the receiver prints the paper at his or her place. Sending a fax the normal way brings a lot of paper work and is of course a slower way of communicating than E-commerce, but today ERP systems can automatically produce and send a fax directly to a fax machine or another ERP system. This is a good way of sending information to partners in the supply chain that do not have the ability to use EDI or other means of E-commerce. (Mattsson, 2002)

4.2 Improving processes

As explained above, ERP systems can make the business processes of a company more effective. The modules of the ERP system have to be adjusted to fit the company's processes, but at the same time the processes have to be redesigned in order to take full advantage of the system and the information technology (IT). The risk when implementing an ERP system and using IT is that it is used only to automate the existing processes. Some authors refer to this as "paving the cow paths". (Rentzhog, 1998; Sharp & McDermott, 2001)

We will now introduce the concept of Business Process Reengineering (BPR) as well as other methods for improving processes. We will also discuss the supply chain perspective of processes. However, first we present our definition of what a process in fact is.

4.2.1 What is a process?

There are as many definitions of what a process is as books written about the subject. Many authors describe a process as a chain or series of activities. Rentzhog (1998) define a process as (freely translated):

> *"A process is a chain of activities that in an iterative flow creates value for a customer"*

This definition gives a general but rather vague picture of what a process is. It does however emphasise that the process is repeatable. Over time, the same chain of activities will be repeated over and over again while creating value for the customers. A more detailed definition is given by Sharp and McDermott (2001):

> *"A business process is a collection of interrelated work tasks, initiated in response to an event, that achieves a specific result for the customer of the process."*

As well as the first definition, this also states that processes consist of a series of activities or work tasks that generate a result for the customer. This definition adds the thought that the process is triggered by an event. It does however not say that a process should be repeatable.

The first two definitions both give a customer focus. Willoch (1994) goes even further in focusing the customer (freely translated):

> *"A process is a collection of connected activities, which creates value that the customer can understand, i.e. a work performed by the organization and that the customer is willing to pay for."*

Thus, every process has to create value that the customer is willing to pay for. We consider this to only apply in a perfect, utopian, organisation, since a "real" organisation is bound to have processes that in fact do not add customer value but add business value, i.e. they create conditions for the customer value adding activities to work.

Harrington (1991) defines a process as follows:

> *"Any activity or group of activities that takes an input, adds value to it, and provides an output to an internal or external customer. Processes use an organization's resources to provide definitive results."*

This process definition maintains that something is fed to the process, the input, which is transformed into an output by adding value. The output is provided to both internal and external customers.

We have interpreted these definitions and created our own image of what a process is. A process, according to us, has to fulfil the following criteria.

- A process consists of a series of work tasks. The work tasks are put in a particular sequence which means that the work is structured and repeatable.
- A process takes an input and transforms it by adding value into a result for a customer, which can be internal or external.
- A process is triggered by an event, this might be concrete as the income of an input or abstract as oral instructions or a decision.

This will be the definition of a process throughout this thesis.

4.2.2 Business Process Reengineering

In general, companies began reengineering their processes during the 1980s, and Business Process Reengineering became a big craze with Michael Hammer's (1990)

article “Reengineering work: Don’t Automate, Obliterate.” Hammer called reengineering “undoing the industrial revolution”, but the revolutionary changes that the BPR proponents advocated did not have the wanted effect because although reengineering was easy, implementing the new process was difficult. BPR got even worse reputation, sometimes without reason, when it got associated with downsizing and outsourcing. However, BPR has gained ground once again during the latter years, with a little less revolutionary view of reengineering and more carefully planned implementations. (Sharp & McDermott, 2001)

Nevertheless, literature about BPR still stresses the importance of striving for fundamental and radical change and not being satisfied with minor improvements. (Hammer & Champy, 1993; Rentzhog, 1998; Bergman & Klefsjö, 2001)

Hammer and Champy (1993) stresses that the way to change old rules and assumptions, in order to reach radical improvements, is not to further develop the existing process. They emphasise “the blank-sheet” approach. This approach builds on the creation of a new process from scratch, with no regard of the existing one. They are also convinced that BPR can not be carried out in small and careful steps. It has to be about “all or nothing”, but it can result in an impressive result when performed properly. The question to be asked is not “How can we do the things we do faster, better and at a lower price?” The question should rather be “Why are we doing the things we do?” Hammer & Champy maintain that just adjusting some details in the process with the intention of increasing the efficiency is a waste of time. The fact is that a “repair” of the individual parts in the process is the best guarantee for a continuous low efficiency.

One of the basic ideas behind BPR involves the use of information technology (IT), as Sharp and McDermott (2001) express it: “BPR and IT – joined at the hip”. IT and information systems (IS) has all too often been used to automate and speed up the old processes, or “paving the cow paths”, with the result that only a fraction of the improvement possibilities of IT is obtained. To achieve the full advantages of IT and IS, for example when implementing an ERP system, the deep-rooted ideas of how things should be done have to be destroyed, thus the processes have to be reengineered. (Hammer & Champy, 1993; Rentzhog, 1998; Bergman & Klefsjö, 2001; Sharp & McDermott, 2001)

It has to be pointed out that even though many authors stress the importance of radical changes and the “blank sheet” approach, in recent years this opinion has been soften up. Today, it is generally acknowledged that there is a need to map and understand the current process before designing the new one. This subject is further discussed in chapter 4.4 Process mapping.

BPR can bring great improvements, but the costs and risks are very high. A big share of the BPR projects has failed in the intention of reaching dramatic improvements, and often a reengineered process will not work perfectly initially if the knowledge and the experience from the past are not used. Nevertheless, it has to be pointed out that a lot of successful reengineering projects have been performed as well. (Rentzhog, 1998; Bergman & Klefsjö, 2001, Sharp & McDermott, 2001)

4.2.3 Continuous process improvement

Continuous process improvement techniques analyse the existing process’s possibilities of improvements and thereafter carry through suitable adjustments. This way existing knowledge is not neglected. It is important to make the process improvement to a continuous development, since the environment is in constant change. An advantage of this is that every time a team or an individual analyses the processes, makes the improvements, and thereafter observes the effect of it, they learn more about the process. This new information can then be used for further improvements. (Rentzhog, 1998)

This way of thinking is illustrated in the PDSA cycle by Deming (2000), see Figure 4.2. The PDSA cycle is a systematic method for tackling product or process problems. It starts with the *plan* phase when a problem is discovered. The essential reason for the problem is established and if it is to big it is broken down to smaller, more handily problems. Data is gathered, the sources of error have to be found and it is important to base all decisions on facts. The *do* phase that follows involves carrying out the test, comparison or experiment. In the third phase, *study*, the result gets examined. Is it what was expected? If not, what went wrong? The study phase makes the foundation for the last phase, *act*, where the change is adopted or abandoned, or maybe another run though the cycle is necessary. The strength of the PDSA-cycle is that the size of the projects is not of importance, which often is the case for BPR. Each run through the cycle might include anything from a large improvement project to small adjustments.

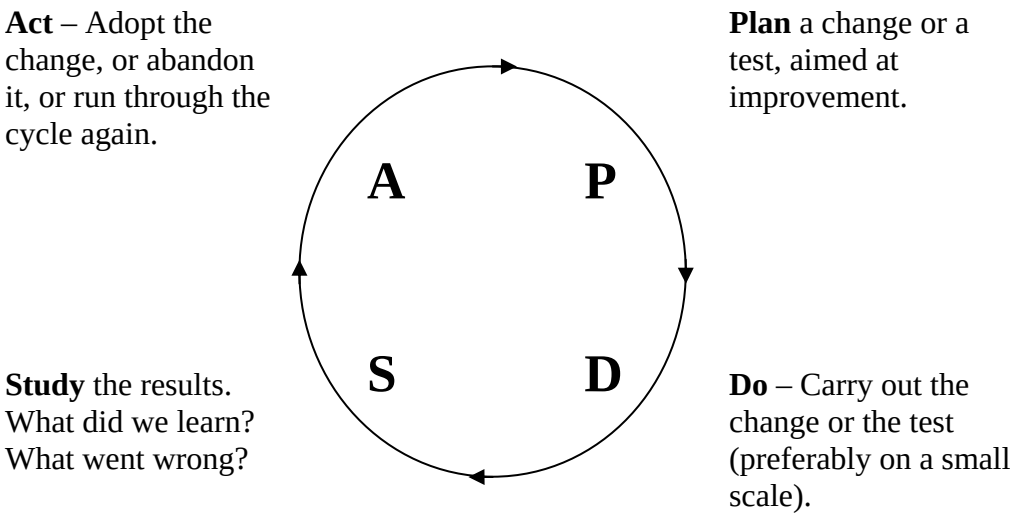


Figure 4.2: The PDSA cycle illustrates continuous improvement of a product or a process. (Deming, 2000)

Benchmarking is another method for finding possibilities for continuous process improvement. The idea is to compare the own processes against either another identical or similar process within the company, or study another company's processes. In this method a modified type of the PDSA-cycle can be used. The difference is that the do phase includes searching for suitable processes, study them and performing an analysis. Furthermore, the study phase is instead an adapt phase where the best benchmarked process is adapted to the own environment, and the act phase is in fact an improvement phase where the chosen process is implemented and measured. (Bergman & Klefsjö, 2002)

The target with benchmarking is to continuously improve the processes in order to reach better customer satisfaction than the competitors. It has to be done with caution though, the right modifications of the process have to be done to suit the own environment. Another risk with benchmarking is when a company copies the process without improving anything. Then they are never going to become better than the object for the benchmark study, only as good as it. (Ibid.)

To sum up, continuous process improvement always builds on an existing process. This means that the work is less extensive than it would have been if the process was created from scratch since parts already working fine do not have to be developed again. The costs and the risks are smaller for continuous process improvement compared to BPR, but the improvement potential is also smaller. In some cases the

process is not suited for the situation, so the only way out, to get a well working process, is to reengineer it. (Rentzhog, 1998)

4.2.4 BPR and continuous process improvement complementing each other

BPR and continuous process improvement are usually considered as two completely different approaches to further develop processes. However, Davenport (1993) suggests an alternation between the two different approaches, see Figure 4.3. BPR is performed as a delimited activity in specific occasions. Between two BPR activities continuous process improvement is used to further develop the process. If the continuous improvement is not performed, Davenport (1993) argues that there is a risk that the process will gradually worsen.

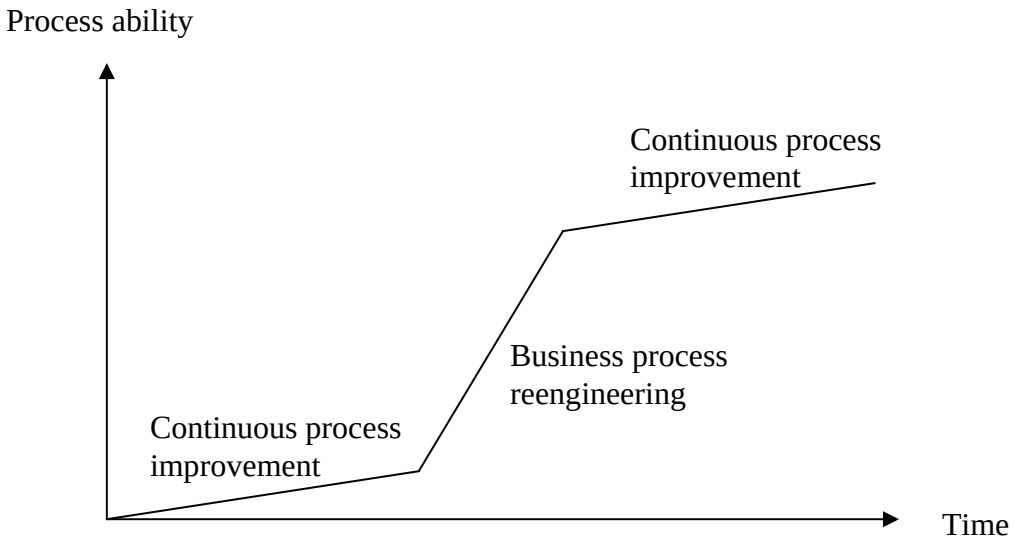


Figure 4.3: BPR combined with continuous process improvement. (Davenport, 1993)

Even though most authors seams to agree that both strategies are necessary, there is a disagreement if these two different approaches support or counteract each other. For instance, Hammer and Champy (1993) suggests that they should be performed totally separate from each other. Regardless of whether continuous process improvement or BPR is used, it is always important to have the organisation behind the back and a willingness among the employees to change the processes. (Rentzhog, 1998)

4.2.5 Improving the processes of the supply chain

Since we include the suppliers, Nobilia in particular, in the analysis of the order process, we want to discuss the Supply Chain Management (SCM) perspective as well. Christopher (1998) stresses the importance of focusing the whole supply chain and not just the company itself. He argues that the competition today is supply chain against supply chain rather than company against company. His definition of a supply chain is:

> *"The supply chain is the network of organisations that are involved, through upstream and downstream linkages, in different processes and activities that produce value in the form of products and services in the hands of the ultimate customer."*

An illustration of a simple supply chain is presented in Figure 4.4.

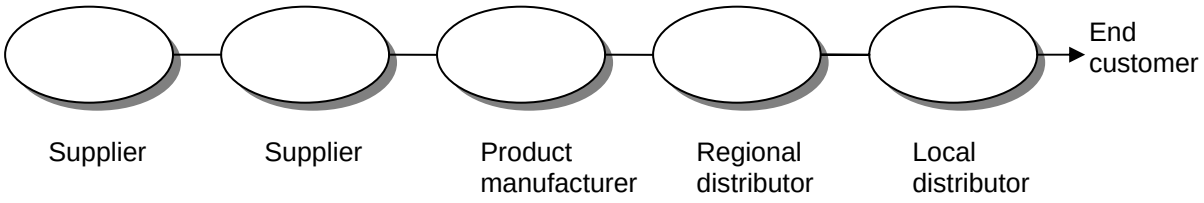


Figure 4.4: A simple illustration of a supply chain. (Mattsson, 2002)

The objective with SCM is to link and coordinate processes of the different entities of the supply chain. In fact, many processes in a company continue in other companies in the supply chain, e.g. the order process. This shows the importance to have a process orientation in the supply chain as well as involving the external customers and suppliers in the process development. (Christopher, 1998; Mattsson, 2002)

To clarify what kind of process we mean, we will henceforth call a process within a company a business process and process that continues throughout the supply chain a supply chain process. We will continue to just use the word process if the type of process is not of importance.

To achieve an effective supply chain it is important that the customer and its supplier have a close relation to each other. The difficulties and limitations in managing the supply chain effectively have much to do with a functional orientation and behaviour in the organisations. Both partners have to realise that integrating and focusing the supply chain processes is a win-win situation for both companies. Together the companies can increase the total competitiveness of the supply chain and avoid sub-

optimisation. To process orientate the companies are often of great importance when trying to cooperate and integrate over the company boundaries, with the objective to create more effective supply chains. (Ibid.)

Normally, however, a company is seldom in a situation where it only has one supplier and one customer. The company is usually active in many supply chains, Langenwalter (2000) calls this the supply web, and to focus all the supply chain processes of the supply web would cost too much. The supply chain that has most improvement potential should be focused, with the available resources taken in consideration. In order to facilitate the integration of the supply chains, a company should reduce the number of suppliers. It is easier to build up relationships and trust with a few suppliers and integrate them into the company's processes. (Christopher, 1998; Mattsson, 2002)

One great facilitator for SCM is information technology. Linking two companies' ERP systems together with EDI, or using a web-EDI interface, has made integration and process orientation of the supply chain much easier. (Christopher, 1998)

4.3 Actions for improvement

Up till now, we have discussed general strategies for improving processes, e.g. BPR. We will now introduce more concrete methods for making a process more effective. Making supply chains more effective is much about creating better possibilities for exchange and flows between companies, while improving a business process is about creating conditions for exchange and flows between functions. Therefore, the methods for improving business processes and the methods for improving supply chain processes are much alike. (Mattson, 2002)

The actions for improving processes that we will discuss are:

1. Simplification and rationalisation
2. Information exchange
3. Automation
4. Reconfiguration
5. Cooperation

Their relative order is to prefer when improving a process. For instance, there is no need for information flow into a process step that has been taken away through

rationalisation or to automate unnecessary activities. Most methods can be used both to improve business processes as well as supply chain processes, with a slight modification. (Mattsson, 2002)

4.3.1 Simplification and rationalisation

A process is built up by process steps and activities. Normally, most of these activities are necessary for the process to run properly and produce the expected value. However, processes often have activities that do not add value to the company or the supply chain. Thus, as a first step when improving process, these unnecessary activities have to be found and eliminated. Furthermore, activities that do add value to the result might not be performed in an effective way, so the next step is to make these important steps more effective. (Hammer & Champy, 1993; Dicander Alexandersson et al., 1998; Sharp & McDermott, 2001; Mattsson, 2002)

An effective tool when finding unnecessary process steps and activities that are not carried out effectively is process mapping. How the process mapping is performed is explained in chapter 4.4. By mapping the current processes it is easy to see what needs to be changed and what is working fine. After the improvement has been carried out it is useful to have the map of the former process to compare with in order to see what have become better and what is still not working properly. (Dicander Alexandersson et al., 1998; Sharp & McDermott, 2001; Mattsson, 2002)

A process' activities and steps are often carried out in different companies in the supply chain, in different functions and departments within the companies and by different individuals within the departments. Every handoff between individuals, departments or companies brings time loss and transferring costs. An often successful way to simplify the process is to combine activities so the number of individuals involved in the process is decreased. On the other hand, this way the work tasks are broaden and made more complicated, so there is a competence limit and also a limit where the loss of the advantage with specialisation appear. (Hammer & Champy, 1993; Dicander Alexandersson et al., 1998; Sharp & McDermott, 2001; Mattsson, 2002)

Another action that can be taken in order to shorten the throughput time is to perform two independent activities at the same time. A similar thing to do is to lift out activities from the "critical" line. An example of this is that the operator does not have to stop the process to do a quality control. (Sharp & McDermott, 2001; Mattsson, 2002)

An example of a way to simplify and rationalise a process is to implement a silent acceptance of order acknowledgement. This way the customer does not demand an order acknowledgment from the supplier, an order is acknowledged if the supplier does not contact the customer within a given timeframe, e.g. two days. (Mattsson, 2002)

4.3.2 Information exchange

Information flows differently than material and payments. The information flow is sometimes considered to be less important to improve compared to material and payment flows, since it does not represent tied up capital or a direct economical resource. To think like that is a mistake. Access to information is necessary when trying to run an effective business and a condition for optimal resource utilisation in the supply chain. Furthermore, an effective information exchange with customers and suppliers in the supply chains is a key condition for cooperation and integration. (Christopher, 1998; Mattsson, 2002)

It is important that the quality of the information is high, i.e. that the information is correct, exact and up to date. If not, if the decisions are based on poor information, wrong measurements and actions will probably be taken. The introduction of information technology and information systems has facilitated the information exchange and improved the conditions for providing high quality of the information. For instance, in ERP systems information only have to be entered in one place in order to update the information for the whole company. (Sharp & McDermott, 2001; Mattsson, 2002)

4.3.3 Automation

Automation can be defined as a technology, which through the use of mechanical, electronic and computerised systems can create value without, or with limited, human involvement. Thus, simply explained, work carried out by employees is performed by some kind of automation instead. The human role can be completely eliminated by totally automation or partly through partial automation. In the latter case, the manual work is often some form of controlling or completion function. (Mattsson, 2002)

To enter information is an important task that can, through automation, reach higher efficiency. An example is to automate administration work. This way the

administration costs are reduced and the lead times decreased. A more concrete example of a process or activity that can be automated is the transfer of an order between departments or between companies. Manuel work like receiving or reporting an order can be automated through communication between the systems, i.e. the order is sent in digital form between departments or companies. The advantage is that much of the paper work disappears as well as the work of entering information into the system. (Ibid.)

Another example is automated messages of approaching deliveries. The purpose is to forewarn the receiving company that a delivery is coming, so preparations for reception of goods and possible forward transports can be prepared and synchronised. (Ibid.)

4.3.4 Reconfiguration

As has been discussed, every interface between individuals, within departments as well as between companies, is time consuming and brings transaction costs. A way of dealing with this problem is to redistribute and merge the performing and responsibility for activities and process steps, thus reducing the number of interfaces. This method is called reconfiguration. (Hammer & Champy, 1993; Dicander Alexandersson, 1998; Sharp & McDermott, 2001; Mattsson, 2002)

Compared to performing a reconfiguration within the business, reconfiguring the supply chain processes also includes redistribution and merging of activities that are carried out in different companies. Thus, reconfiguring supply chain processes means that employees of one company will carry out administrative activities in another company's processes. One type of reconfiguring is when a company relieves the customer company of activities in a supply chain process, or when a supplier lets the customer company perform certain activities in its own business processes. (Ibid.)

Mattsson (2002) presents the following examples of reconfiguration. These examples are most relevant for supply chain processes, but can with a little configuration just as well be applied to business processes.

- The customer company's buyer enters an order in the supplier's order handling system, for instance by using web-EDI. Information of price and availability of

the products can be handed over directly without personal contact between the companies.

- The customer enters orders in its own ERP system. The orders are then transferred by, for instance, EDI in batches into the supplier's system. Controls are performed manually by an order receiver or automatically by the system.
- A more integrated example is when the customer enters and finishes the order registration into the supplier's system. The customer has an online connection to the supplier's ERP system and can finish the whole order registering process. This means that the customer carries out all tasks of the order registering process and the supplier does not have to be involved at all, with the additional effect that there is no need for order acknowledgement.

By performing these reconfigurations the total supply chain cost can be reduced, mainly because of two reasons. The first one is when the customer registers a purchasing order, and the supplier registers a customer order, the same tasks are performed twice. With the right reconfiguration this double work can be eliminated. The second reason is that a reconfiguration can eliminate the need for direct contact between the customer and the supplier. Information that the customer before had to ask for and the supplier had to provide, can now be obtained by entering the supplier's ERP system. This is an advantage when it is hard to get in contact with the supplier, e.g. if the supplier is located in another part of the world with a large time difference and a different language. Another benefit from reducing the number of interfaces and transferring the information electronically is that information no longer has to be entered manually and there are fewer handoffs. This reduces the risk for mistakes and misunderstandings. (Sharp & McDermott, 2001; Mattsson, 2002)

4.3.5 Cooperation

The last method, cooperation, is mostly a method for improving supply chain processes. Cooperation means synchronisation and coordination of the business processes within the supply chain. The goal is to achieve more effective flows in the supply chains and a more effective use of resources in the value creating companies. (Dicander Alexandersson, 1998; Mattsson, 2002)

Cooperating along the supply chain brings huge improvement potentials for the supply chain processes. However, synchronising flows and coordinating activities demands more than just technical solutions like, for instance, EDI. The companies in the supply

chain also have to have a willingness to share information and cooperate. (Mattson, 2002)

4.4 Process mapping

As has been discussed, some proponents of BPR stress the importance of the "blank sheet" approach. Others claim that analysing and understanding the current process is just as important for BPR as for continuous process improvement. (Davenport, 1993; Willoch, 1994; Rentzhog, 1998; Bergman & Klefsjö, 2001; Sharp & McDermott; 2001)

Davenport (1993) presents the following four reasons why existing processes always should be documented before designing the new one:

1. *Facilitate communication.* A common understanding of the current process and its problems enables the participants to see the reasons for the redesign and the advantages of the new process model.
2. *Enable implementation.* Documenting the current process has to be a part of the implementation planning in order to understand the magnitude of change and the tasks required for the implementation.
3. *Avoid repeating the same mistakes.* Routines and rules in the current process were implemented by a reason. If they are not analysed the same old problems will probably emerge once again.
4. *Measuring success.* The success of the new process can be evaluated relative the current process.

Thus, mapping the current process is always of great importance when improving a process, no matter which improvement strategy is used. Many different methods for mapping processes, which are more or less systematic, have been developed over the years. We have chosen to discuss two of the more systematic approaches here. These are the process mapping techniques given by Keller and Jacka (1999) and by Sharp and McDermott (2001). The ones not discussed show a great deal of resemblance to those presented here, hence we find it redundant to explain them as well. The approaches we found redundant to explain due to the similarities are given by Harrington (1991), Willoch (1994), Rummler and Brache (1995), Dicander Alexandersson et al. (1998) and Rentzhog (1998).

4.4.1 Process mapping method by Keller and Jacka (1999)

As said before, the mapping method by Keller and Jacka (1999) is a systematic approach for documenting the processes. They use interviews and observations to gather data and they describe the activities, sequences and relationships in the process by using symbols, lines and words. The process mapping strategy is divided into 5 different steps:

1. Establish process boundaries.
2. Develop the data gathering plan.
3. Interview the process participants.
4. Generate the process map.
5. Analyse and use the process map.

The first step is to set the objectives with the review and establish how the process starts and how it ends. Every process in a company is enmeshed with every other process and a review of the purchasing process can lead to examining the production process which can lead to an investigation of the design process et cetera. Thus, if the boundaries are not defined properly the audit could go on forever. With the boundaries of the process established, the mapping object with its inputs and outputs can clearly be described. The reason why the process is under review should clearly appear from the objective.

When the first step is completed the initial understanding is documented. This documentation contains the starting and ending events and the inputs and outputs. It also reveals the objective, risks and controls of the process as well as how the success of the process is being measured. This documentation is updated as soon as new information about the process is gathered.

The second step is to develop a plan to gather data. This involves determining which data is needed, who should be interviewed, and which questions should be asked. The primary method for collecting information is through employee surveys. This questionnaire is sent to the employees before the visit and the answers provide a first glimpse at the workflow, the problems and potential improvements. It also encourages the employees to start thinking about their workflow.

With the data gathering plan completed the interviews can begin. The interviews give an understanding of how the process works which is documented in process maps. The

third and fourth steps of the strategy are actually performed simultaneously since this has been proven to generate the most accurate maps. Therefore there are always two auditors present at the interviews; so that one can concentrate on the discussion and the other focuses on the creation of the map. The result from the questionnaires is used as a starting point for the discussions and large blank sheets of paper, one for each process, are attached to the walls of the room. Sticky notes with the appropriate symbols are used to represent each process step. A description of the process step is written on the note using a verb with an associate noun, e.g. “complete form” or “file complaint”. Finally the cycle times and waiting times are noted on the map. If the times cannot be determined they are estimated.

The last step, analysing and using the process map, is performed simultaneously with the map development. This way problems and potential improvements can be identified during the way, but the final evaluation must wait until the maps are completed. The documentation that was put together after the first step may now come in handy once again. The auditor should review the process objective and determine whether it is being met.

4.4.2 Process mapping method by Sharp and McDermott (2001)

This method, called workflow modelling, is not just a mapping method but a systematic method to improve processes with an information system taken in consideration. However, like we have discussed before, improving a process demands an understanding of the current one, and this is the opinion of Sharp and McDermott as well. We will only discuss the process mapping part of their method in this chapter.

The process mapping part is divided into two phases, *Frame the process* and *Understand the current process*. The first phase includes identifying the process and setting its boundaries, performing an initial assessment of it and setting the objectives for the future process. This is the most important phase since it prevents future problems. The second phase, understand the current process, includes modelling the workflow and performing a more detailed assessment. We will now further explain the two phases.

In contrast to the mapping method by Keller and Jacka (1999), this method does not use interviews to gather information but teams with employees from every function or department that is involved in the studied process. These teams are involved through

the whole mapping process. Interviews could be used as well, but Sharp and McDermott (2001) argue that it would be much more time-consuming.

The identification of a process starts with a general brainstorming of the process in focus which gives everyone in the team a chance to participate and it can generate a lot of raw material. The brainstorming continues with finding the *milestones* of the process. A milestone is an event of great importance in the process, e.g. “product is reserved” or “shipment is packed”. The milestones are linked together and the process is assembled based on the milestones’ relationships with one another. All milestones have a process step or task belonging to them. To give names to these process steps or tasks is easy once the milestones are identified. This method uses the same name standard as Keller and Jacka (1999) constructed of a verb and a noun, which clearly identifies the intended result. For instance, if the milestone is “product is reserved” the process step is called “reserve product” and the milestone “shipment is packed” has the process step “pack shipment”.

The triggering event of each process is then identified. This establishes the starting point which helps the developing of the swimlane diagrams presented in chapter 4.4.3. This event is normally an action by an outside or inside actor, e.g. a customer placing an order. The result of a process or a process step is often the triggering event of the following one.

At this point an initial assessment of the process takes place. By measuring cycle times, costs and efficiency et cetera, this assessment is an important tool when confirming that improvements are achieved with the future process. However, this is not the only tasks performed in the assessment. The process should also be looked at in terms of *actors*, *stakeholders* and *enablers* in order to get a better understanding of the current process. The actors, or roles, are the main departments and job functions involved in the process. But external roles as customers or suppliers might be included as well. In order to take the information system in consideration it might be considered as an actor as well. These actors have an important function in the swimlane diagrams presented below.

A stakeholder is anyone that might have an interest in the business process. The customer is an obvious stakeholder, but others may exist as well, e.g. the company itself. For instance, the customer is satisfied by the fulfilment of the customer’s order,

but it must also be paid for, which satisfies the shareholders. There are three stakeholders that must be accounted for, these are:

- Customers (outside or inside the company, always a recipient of a result from a process)
- Performers (employees or external contractors)
- Owners and managers

Other stakeholder groups may also be appropriate to consider, e.g. suppliers. The perspective of the stakeholders is obtained not by guessing, but by asking. Speculating what the stakeholders want will never reveal the truth. The perspectives of the stakeholders all put together will get a good overall picture of the purpose of the process.

An enabler is what helps the process work. To look closely at the enablers is actually not done until after the modelling of the current process, but a quick preview might facilitate the job. The six enablers are:

- *The workflow design*. Consider steps, precedence, flow, handoffs (a handoff is when the process flow goes from one department or individual to another), etc. to find bottlenecks and other problems.
- *Information technology*. It is more important to do the right thing than to do the things right, i.e. do not automate poorly designed workflows with information technology and thereby making them harder to fix.
- *Motivation and measurement*. This is the most important enabler. The employees have to be measured and rewarded for the right thing. An example is a quality control group that is measured and rewarded depending on the number of defects they discover. This group will find an increasing number of defects even though the process is improved, with delays and expenses as result.

- *Human resources*. Consider organisational structure, job definitions and skills. Boundaries in the organisation may introduce undesirable handoffs or segmentation, the same thing that exceptionally narrow job definitions might

bring. Employees struggling with tasks outside their field of competence leads to problems as well.

- *Policies and rules*. Out-of-date policies and rules, for which the original motivation is long since forgotten, makes jobs more complex, frustrate customers and slow down the process. They have to be updated or eliminated.
- *Facilities*. Consider the workplace design and the physical infrastructure. Are they obstructing or helping the processes?

By now the team should have enough information and understanding of the current process to be able to state the objectives and a vision of the future process. This is the end of phase one. This phase ends in a summary poster stating the gathered data. This poster is to be posted at the workplace and can encourage valuable feedback and keep the participants on track.

The second phase, understand the current process, starts by modelling the workflow. This method uses large blank sheets of paper and yellow sticky notes for the mapping, just like the method provided by Keller and Jacka (1999). The work will flow more smoothly if the team avoids bogging down in detail. Some guidelines for avoiding this are:

- Start with the mainstream, normal case. Model one case at the time.
- When at a decision point, follow one branch and come back to the other later.
- Focus on what is next. Who gets the work next? What happens next?
- Do not explain in too much detail.

The process mapping is performed in loops, digging deeper and deeper with each iteration. Swimlane diagrams are used to model the workflow. Shortly described, swimlane diagrams show not only in what sequence the work gets done, they also show who, or which actor, performs each task. How the swimlane diagrams are built is explained in more detail in chapter 4.4.3.

There are three levels of detail when making the swimlane diagrams in the process mapping. First the “handoff level” (level 1) diagram is constructed. The handoff level diagram is also called an “involvement diagram” since it captures which actors are involved in the workflow, but without details about the specific work they perform. The handoffs from one function or department to another are shown at this level, but details about the steps are minimised.

If enough understanding is achieved at the first level the iteration stops. If not, the team proceeds to the next level, the “flow level” model. This second level is also called the “milestone level” diagram. With the handoff level diagram as foundation, the milestones are added and they are used to understand the key steps that determine flow or impact overall performance.

Once again the team has to ask themselves: do we have enough understanding of the process? If not, the “task level” diagram has to be constructed which is the last level. The level 2 diagram shows pretty much what happens, but the level 3 diagram, the task level diagram, shows how it gets done. Enough understanding is usually achieved before the level 3 model, and if it is used, it is normally only for a small part of the process.

To ensure that nothing is neglected in the diagrams, five simple questions are used for each step in the swimlane diagram. These are:

1. What makes it go? (Uncovers missing trigger conditions or events)
2. Is anyone else involved? (More than one actor might be involved in the step)
3. Does the name of the step accurately convey the result? (Ensures that the step really is a legitimate step)
4. Are all outcomes shown? (Uncovers missing outcomes and reveals decision points)
5. If there is a handoff, how does it get there? (Uncovers missing actors)

When the understanding of the current process is satisfying, the second phase of the process mapping ends. At this point, the process mapping part of this approach is completed and the designing of the future process begins.

4.4.3 Swimlane diagrams

Swimlane diagrams can be used both to understand the current process and to design the future process. These diagrams, with slight variations, go by many names, e.g. Rentzhog (1998) calls them *matrix flow diagrams* and Rummler and Brache (1995) call them *role/responsibility matrices*. The name *swimlane diagram* is given by Sharp and McDermott (2001) and we will use their name and definition in this thesis.

Swimlane diagrams shows what gets done by whom and in what sequence. It is a good tool for illustrating the process since they are very easy to read and to understand. An example of a swimlane diagram is shown in Figure 4.5. As can be seen, each actor in the process gets its own swimlane, separated with broken lines from the other actors' swimlanes. Each task or activity in the process is represented by a box with the proper name of the task written inside it. The box is placed in the swimlane that belongs to the actor who performs the task. Arrows are used to indicate the sequence and flow of tasks. When an arrow crosses a swimlane border, i.e. a flow from one actor to another, it represents a handoff.

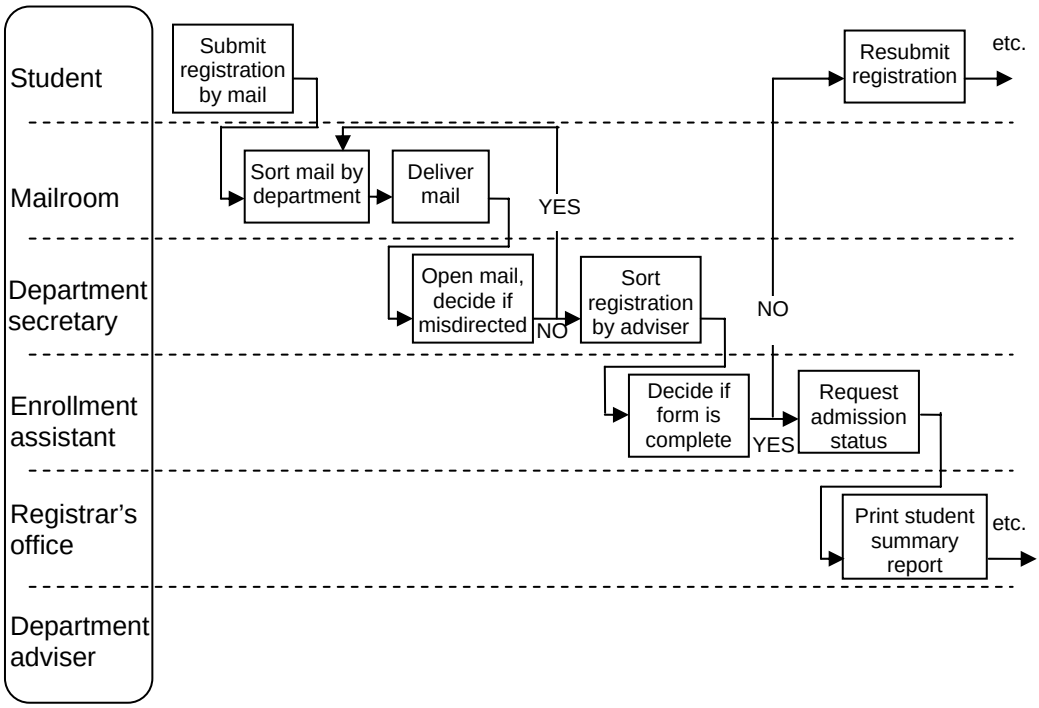


Figure 4.5: A swimlane diagram for the student enrolment process at a university. (Sharp & McDermott, 2001)

Figure 4.5 shows how the swimlane diagram could look for the student enrolment process at a university. After the task "Open mail, decide if misdirected" the line is divided into two branches, one going straight to the next step in the same swimlane and the other going back to the task "Sort mail by department". This indicates that a decision is made and which branch that is followed depends on the outcome of the decision, in this case "yes" or "no". The same thing can be seen after the task "Decide if form is complete".

After a decision is made, as in the task "Decide if form is complete", only one branch is followed. However, sometimes two or more branches are followed simultaneously,

this is called multiple flows. Actually, the tasks in the different branches do not have to be performed simultaneously, but it does not matter in which sequence or order they are carried out. This is illustrated in Figure 4.6, the example used is an insurance claim scenario. The tasks “Identify customer” and “Record incident” do not have to be performed in a specific sequence. The only starting condition that has to be met is that the task “Accept call from customer” is completed. The last task, “Schedule interview”, can start as soon as *both* tasks “Identify customer” and “Record incident” are completed.

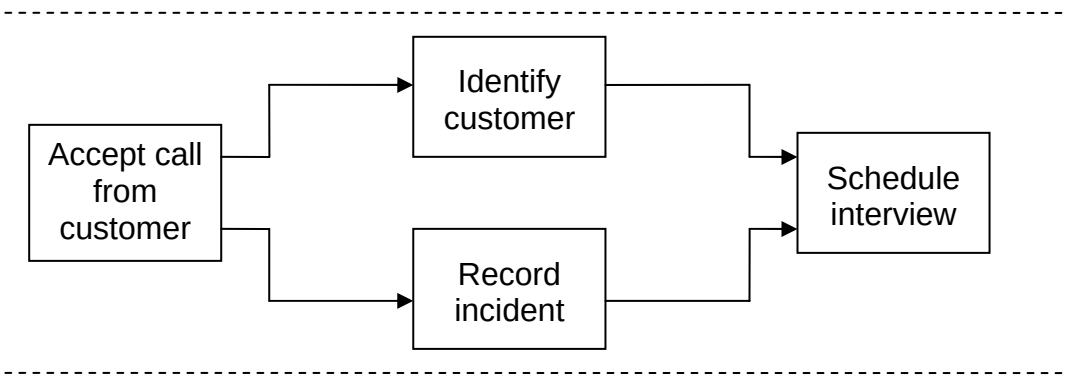


Figure 4.6: Illustrating tasks that do not occur in a specific sequence. (Sharp & McDermott, 2001)

Another special case is when *one* task is performed by *two or more* actors, see Figure 4.7. The task “Accept order” is completed entirely by the order desk, whereas “Develop production schedule” is performed by production planning in cooperation with delivery logistics. The order desk is not involved in the task “Develop production schedule”, hence the broken lines over the order desk’s swimlane. The last task, “Resolve order discrepancy”, involves all actors.

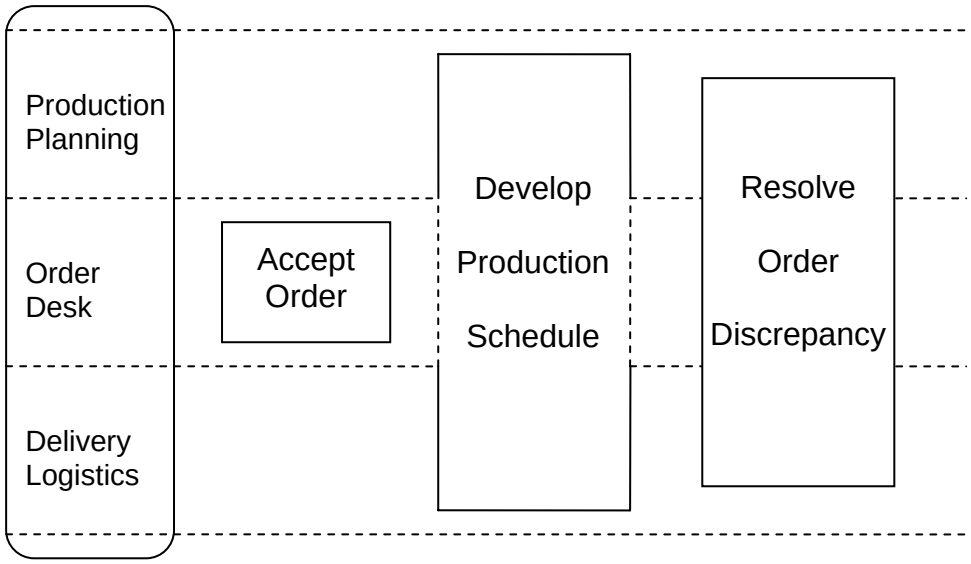


Figure 4.7: Illustrating process tasks performed by multiple actors. (Sharp & McDermott, 2001)

Some authors, e.g. Harrington (1991) and Rentzhog (1998), recommend the use of the symbols from the ANSI standard when drawing the flowcharts. Some of these symbols can be seen in Figure 4.8, but the ANSI standard contains a lot more flowcharting symbols than the ones presented here. The criticism against the use of ANSI standard symbols is that it adds complexity. The idea is to keep the swimlane diagram as easy to understand as possible. Sharp and McDermott (2001) argues that, "Additional symbols will record more data, but will convey less information for many audiences." This is because complicated diagrams intimidate more than simple ones, thus, adding symbols means that less people will read the swimlane diagram. This is of course a trade-off, better buy-in and involvement of the employees at the cost of a less detailed diagram. Nevertheless, we believe that Sharp and McDermott (2001) have a point when they maintain that reaching more people is more important than providing as much detail as possible, therefore we will try to keep the swimlane diagrams simple and easy to understand.

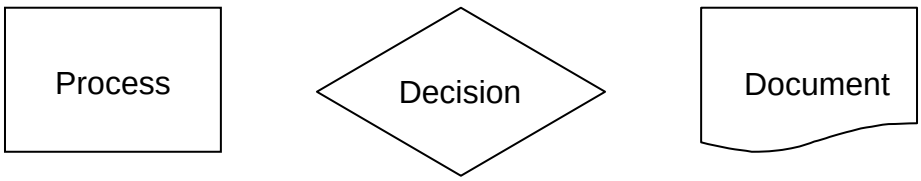


Figure 4.8: Examples of symbols from the ANSI-standard.

4.5 Our choice of methods

Noblessa wants to look at the possibilities of an ERP system implementation and how that could improve the order process. As many authors maintain, this calls for radical changes of the process in order to take full advantage of the system's potential. This leads to the choice of BPR as process improvement method. However, Noblessa is a rather new company and the implementation of the order handling system in the Intranet has forced Noblessa to already change the work tasks of the order process towards an information system implementation. Thus, the existence of out of date routines and unnecessary work tasks might be limited. Nevertheless, we will strive to obtain the best improvement actions possible.

Furthermore, we will use the five actions for improvement presented in chapter 4.3 in order to deal with the problem in a structured way. We will use these improvement actions both when looking at the process within Noblessa as well as when taking the whole supply chain in perspective. But first of all we have to map the process. This is a very important part of the work, maybe even the most important part since this is where the understanding of the current process is achieved and most of its problems are surfaced. Therefore we will present our choice of mapping method more thoroughly in chapter 4.5.1.

We will use swimlane diagrams both to describe the current order process as well as to present the new process model. We do this because we think they are easy to understand and the best way to show how the workflow goes between departments and actors in the process. The current process will be examined and drawn at such detailed level that we feel that we have the necessary understanding to find potential improvements. Sharp and McDermott (2001) argues that it is important to draw the new process model in more detail than the process maps of the current process. This is because the maps of the process model are to be used when implementing the new process. Thus, it is essential for us to explain the new workflow thoroughly for Noblessa. Detailed swimlane diagrams of the process model are also very important for this thesis since it is to be used as a requirements specification for the ERP system purchase.

4.5.1 Our choice of mapping method

We think that the mapping method presented by Sharp and McDermott (2001) is too detailed for this project. If we are to use their method it will take up too much of the

limited time available to write this thesis. Thus, the method by Keller and Jacka (1999) might be more suitable. We think, however, that their method is not detailed enough. Therefore we will use the method by Keller and Jacka (1999) as foundation, but when we need to investigate something deeper we will use parts of the method by Sharp and McDermott (2001).

As in the method by Keller and Jacka (1999), we will use interviews to gather information. Sharp and McDermott (2001) argues that interviews are more time consuming than using teams for mapping the processes, but since we only map one process we believe that the difference in time is negligible. Furthermore, interviews will take up less time for the employees at Noblessa, which is good since they have a lot to do at the time.

We have chosen to use the same main steps that Keller and Jacka (1999) use, except for the last one. We consider this step to be a part of an analysing phase and not the process mapping. This will however be used when designing the future process as a complement to the actions for improvement presented in chapter 4.3. The four main steps are:

1. Establish process boundaries
2. Develop the data gathering plan
3. Interview the process participants
4. Generate the process map

The first step does not need much explanation. We will here identify the starting and ending event of the process, and develop an initial understanding of the process. The information gathered in this step will be documented so we can use it later.

Step two involves determining which data is needed, who should be interviewed and which questions should be asked. The questionnaires used by Keller and Jacka (1999) to provide a first glimpse of the process and its workflow, problems and potential improvements are not used. This is because we were at Noblessa from the start of this thesis and we could get this first understanding and information by observations at site. Our questions for the employees during these initial observations hopefully encourage them to start thinking about their workflow. To complement the observations we also, in the beginning of the project, sent out a few questions to the personnel working at the

order processing department. These questions help us to get an understanding of the problems with the current order process, as well as the things that work well.

Step three and four will be performed simultaneously, i.e. the first preliminary process maps will be developed during the interview with help from the interviewee. As given by the delimitations in chapter 1.4, we will only include one supplier, Nobilia, in the interviews. Swimlane diagrams will be used to show how the workflow goes from one employee or department to another. The swimlane diagrams will first be drawn at en overall level, and then, if necessary, be broken down into more detailed levels.

During these two last steps we will use parts from the method by Sharp and McDermott (2001) in order to get the necessary understanding of the process. For instance getting the actors' perspective or investigate how the enablers help or disturb the process.

5 Noblessa's current order process

In this chapter we present the result from the process mapping. First we present some supporting software used by Noblessa, in order to help the reader understand the rest of this chapter. Then we introduce the order process of Noblessa, first at an overall level and then in more detail. Finally, the major problems of the order process are discussed. The empirical data for the process mapping is collected by interviews with the personal at both Noblessa and Nobilia and observations of the sales department and the order processing department at Noblessa.

5.1 Supporting software

There are mainly three different computer programs that are used in the order process. These are:

- Winner – CAD software for drawing the kitchen
- The Intranet – a web based order handling system
- Briljant – accounting software

These software programs can not communicate electronically with one another at all. All information that is transferred from one program to another has to be read and entered manually.

5.1.1 Winner

Winner is the CAD software used to make the drawings of the kitchen, and provides a 3D view of the kitchen which is very useful for Noblessa. This is because during the sales process the salesman draws the kitchen in Winner and can instantly present a 3D sketch of it for the customer.

Winner is adjusted to the kitchen market and the products from the different suppliers can be included if wanted, for instance, products from Nobilia and white goods from Siemens. This means that the salesman can present the kitchen as it will be, e.g. with the right work top surface et cetera. The drawing will never be an exact copy of the future kitchen since it is hard to capture the exact colour of the surface, but it will provide a good image of it. However, the products from Nobilia can be drawn in any shape. In other words, the salesman can draw products in Winner that Nobilia can not produce.

5.1.2 The Intranet

Actually, the web based order handling system is only a part of the Intranet. The Intranet also provides an information portal where news can be listed and a list of contact information to all of Noblessa's employees, among other things. However, when we refer to the Intranet we mean the order handling system, if nothing else is said. The Intranet has been named NOOS by Noblessa. However, we will continue to refer to it as "The Intranet" throughout this thesis.

The Intranet helps Noblessa to keep track of and manage an order. As said before, there is no communication between the Intranet and the other software, all information has to be entered manually. The information is entered mostly by using checklists, which have fields where the information is entered. The entered information can be anything from the measurements of a cabinet, to a box that is just ticked off when an order has been acknowledged. Noblessa's Intranet has three checklists in the order process. We refer to them as the sales checklist, the OPD-1 checklist and the OPD-2 checklist. How these checklists are used is further explained below when we describe the order process.

The Intranet also provides services for sending information between, for instance, the order processing department and a salesman. Another function is that a fitter can be booked. All of these services will be further described below when presenting the order process.

5.1.3 Briljant

Briljant is the accounting software mostly used by the accounting department. The only time that it comes in contact with the order process is when the invoicing is performed. By using Briljant when doing the invoicing the information is entered in the same system that the accounting department uses. This way the accounting is made much easier when, for instance, comparing the amount of money paid by the customer to the amount on the invoice. Again, there is no direct communication between the Intranet, Winner and Briljant which means that all information has to be entered manually into Briljant.

5.2 Level 1 of the order process

The swimlane diagram for this first level, the hand-off level, is presented in Figure 5.1. This figure is mainly to show an overall view of the workflow of the order process and to present the involved actors. We will not further explain the workflow at this level. For a more detailed explanation see the level 2 presentation in chapter 5.3.

The starting and ending event of the process is already identified in chapter 1.4 Delimitations. The process begins with the customer placing an order and ends when the order is closed and filed by the order executing officer. The order is closed when the kitchen is fitted at the customer and the fitter has faxed the fitting protocol to the OPD.

We have chosen to present the normal case scenario, i.e. the kitchen is delivered to and fitted at the customer. In some cases, Noblessa only delivers the kitchen and the customer fits the kitchen him- or herself, and in other cases, the customer both fetches the kitchen at the Noblessa stock and fits it. The scenario presented is the most difficult for Noblessa, and we believe that if we would present the other two scenarios in the same diagram it would complicate the diagram more than it would help.

The actors of the order process that we have identified can be seen on the left hand side of the swimlane diagram. The order processing department (OPD) is the actor that deals mostly with the order process, if the suppliers are excluded. The workforce working there, the order executing officers, comes in contact with the order from the hand off from the sales department until the order is closed.

The central warehouse was put into use in February 2006, but since the process mapping interviews were performed in January, it is not one of the actors in the swimlane diagrams for the current order process. It will however be taken in consideration when designing the new process model.

The Intranet supports and facilitates the order process. Data is entered continuously in the Intranet, therefore it is always easy to find information of where an order is at the moment. Nevertheless, the Intranet does have its limitations. These will further be explained in the next chapter.

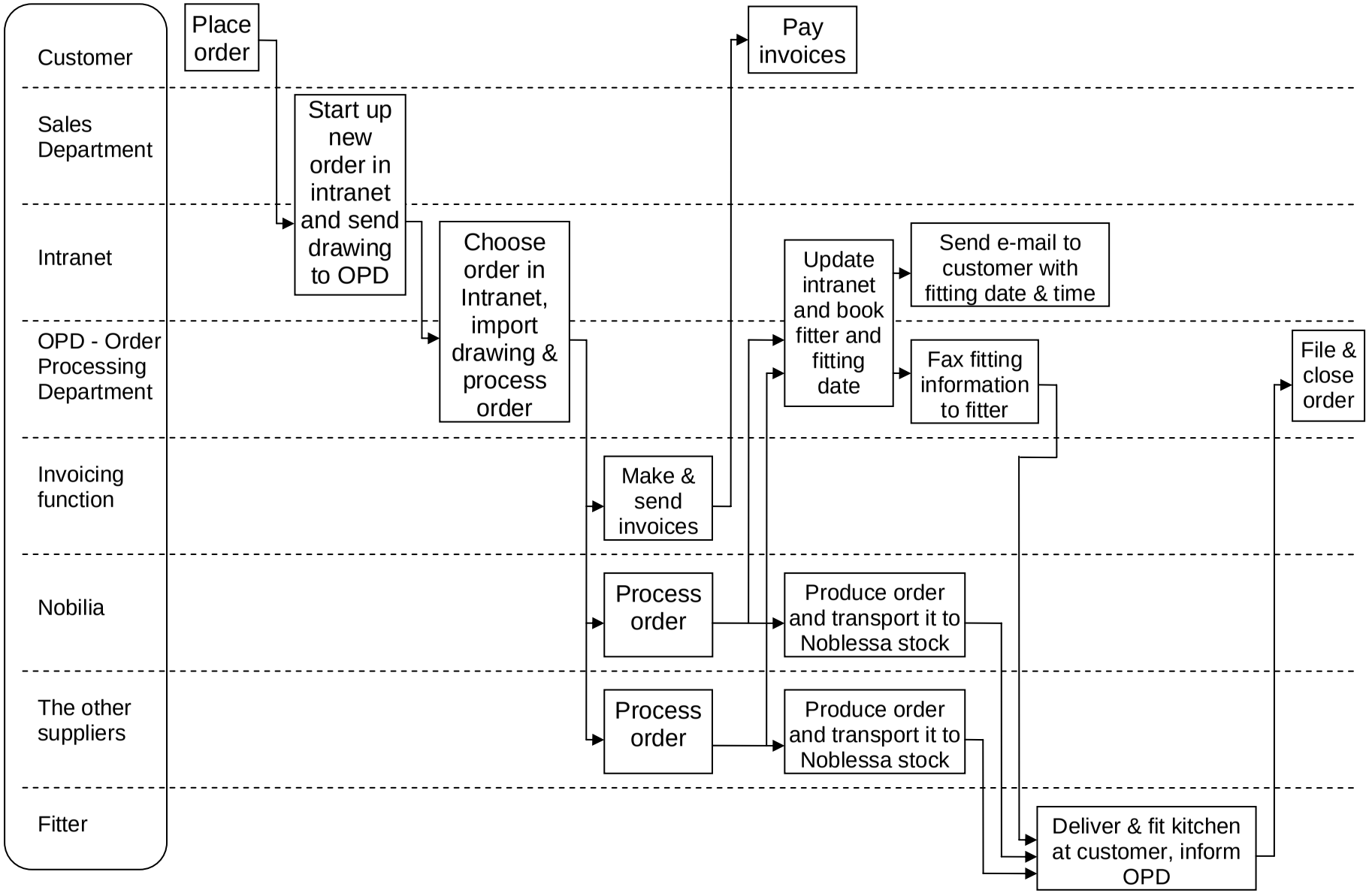


Figure 5.1: The handoff level diagram of the current order process.

The tasks of the invoicing function are actually preformed by an order executing officer. However, we choose to include this function as a separate actor since we think that the order executing officer enters a different role when these tasks are performed. Nobilia has been given a separate role since they are the main supplier of Noblessa. We still want to include the other suppliers because they also have an important role, but there are too many suppliers to look at them all separately. Therefore, we will use the actor *the other suppliers*.

5.3 Level 2 of the order process

The level 2 swimlane diagram of the order process is presented in Figure 5.2 to Figure 5.5. This diagram is also referred to as the milestone level diagram. Actually, the process is at times down to a task level diagram, i.e. the third level. But we will yet present it all at this level. We consider it redundant to present both levels in different diagrams since the differences are not that big.

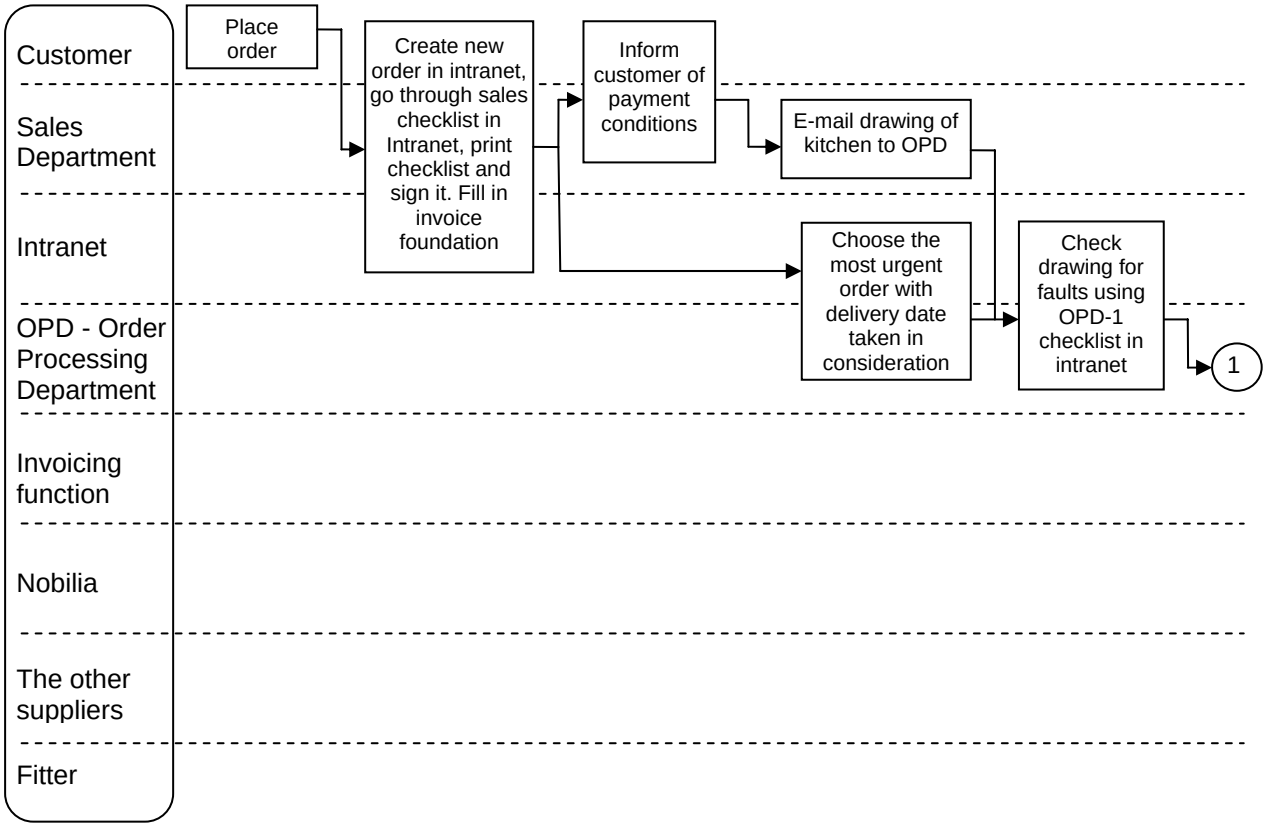


Figure 5.2: The milestone level diagram of the current order process, part 1.

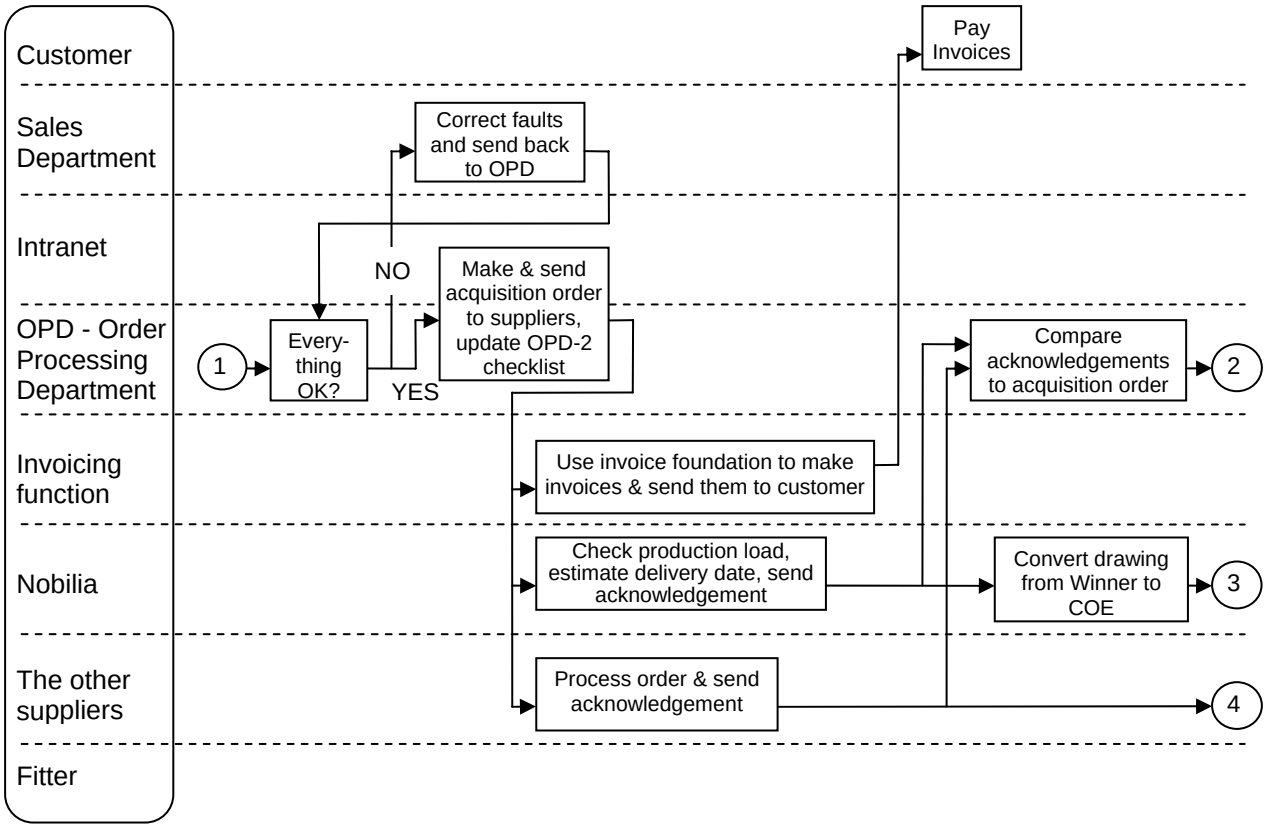


Figure 5.3: The milestone level diagram of the current order process, part 2.

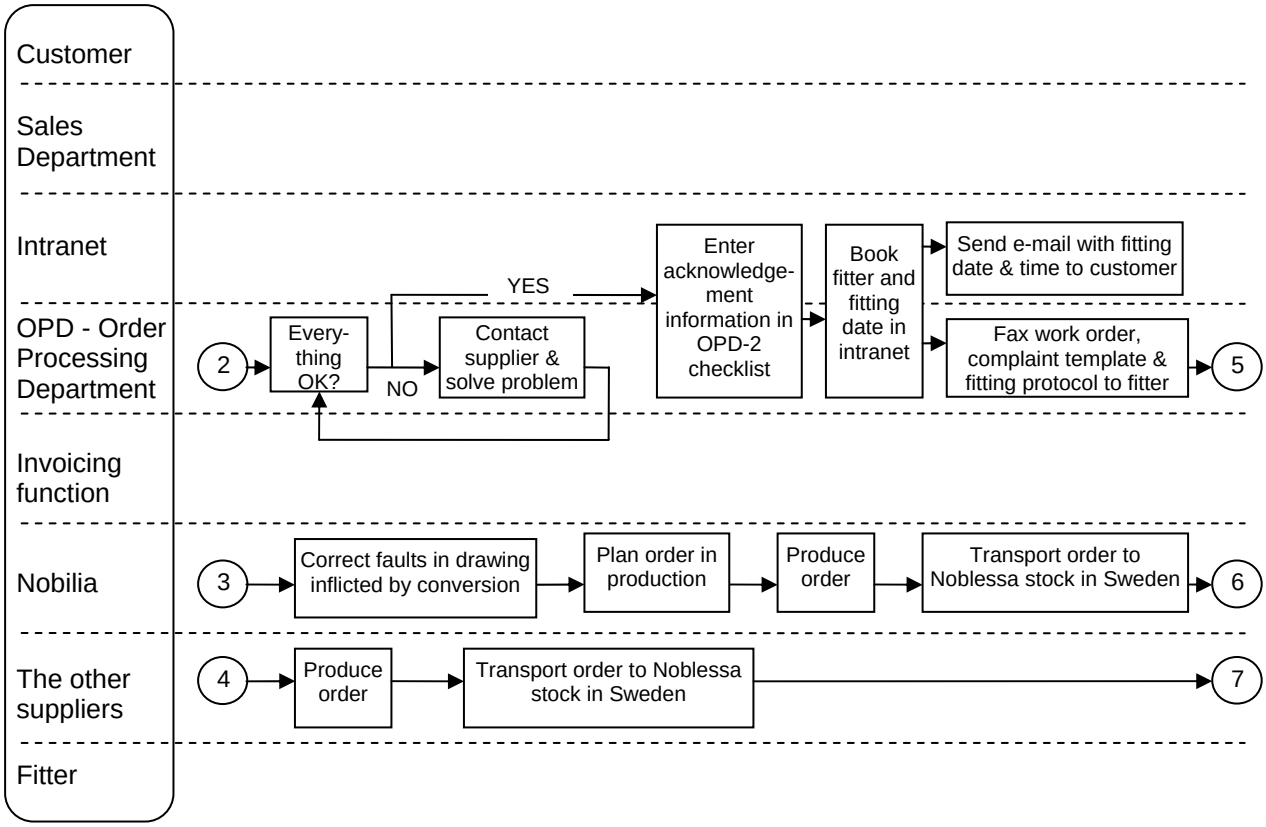


Figure 5.4: The milestone level diagram of the current order process, part 3.

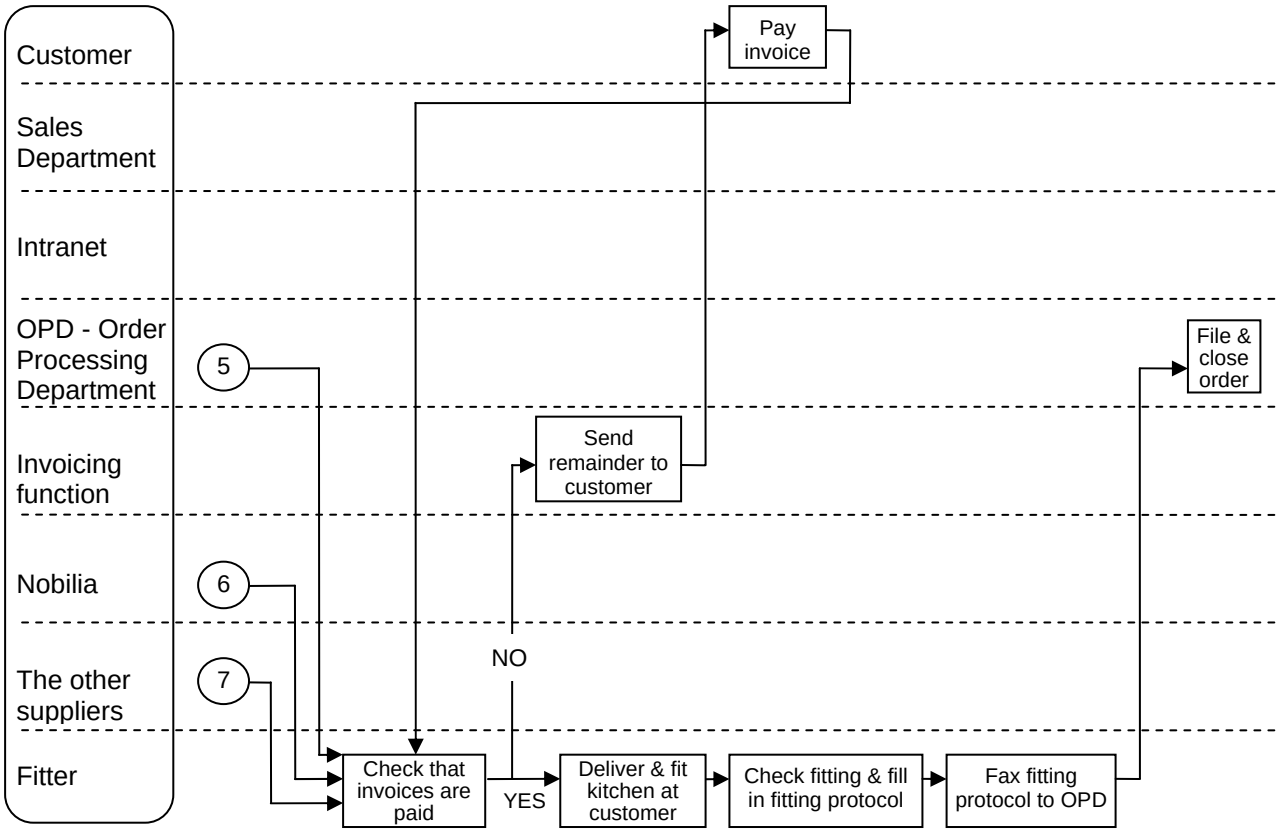


Figure 5.5: The milestone level diagram of the current order process, part 4.

We will now go through the workflow step by step and further explain the tasks performed in each step. We will also discuss problems that might occur along the way. We have chosen to divide this presentation into the following different functions at Noblessa: the sales department, the order processing department, the invoicing function and the fitter. We do this to give the perspective of the personnel working in each function. We will also include Nobilia in this presentation. The actors not included will be treated when they come in contact with the included functions. Thus, the workflow will not be treated in exact chronological order in the text, see the swimlane diagrams for the chronological order.

5.3.1 The sales department

This is where the starting event of the order process takes place. Before the order process starts and the agreement is signed, the customer has had meetings with the salesman a few times to decide which kitchen to buy. The salesman draws different drawing proposals in the program Winner. When the customer has decided on a drawing proposal he or she signs the agreement. The agreement contains a price quotation from Noblessa and a fitting agreement.

When the agreement is signed the salesman opens a new order in the Intranet. The first thing that has to be done when a new order is opened is for the salesman and the customer to together go through a checklist in the Intranet. We will refer to this checklist as the "sales checklist". In this checklist they fill in the customer's address, the delivery address and the wanted delivery date, which products the customer wants, the measurements et cetera. This checklist is used to avoid misunderstandings between the customer and the salesman. The checklist is then printed and signed by both the customer and the salesman and then filed at the sales department. Thereafter, the salesman creates a foundation for the invoice in the Intranet, this foundation is not used until the order reaches the invoicing function, see below.

Before the customer leaves, the salesman has to inform him or her of the payment conditions. This is not always done according to our interviews with the personnel performing the invoicing. The customer sometimes argues that since he or she was not informed there is no obligation to follow the payment conditions. Thus, this might cause problems sometimes.

If the customer regrets something and wants to change the order he or she has to do so within two days from the placing of the order. There are no possibilities to change the order thereafter. There is however a possibility to make an additional order, e.g. an extra cabinet. An additional order is seen as a new order and is treated in the same way as a normal order. Thus, it follows the same flow as a normal order.

The last task performed by the salesman is to send an e-mail to the order processing department with the correct drawing attached. This e-mail is sent to a general address for the OPD and reaches all of the order executing officers. This results in many e-mails in the inboxes of the order executing officers. Furthermore, it is hard for an order executing officer to know if he or she can delete an e-mail in his or hers inbox or if he or she will be the one processing the order later on.

5.3.2 The order processing department

The first task that the order executing officer does is to logon to the Intranet and look at the list of orders that have not been processed yet. The list in the Intranet provides wanted delivery date for each order and the most urgent order is chosen. When an order is chosen an e-mail is automatically sent to the salesman that treated the order before. This e-mail tells the salesman which one of the order executing officers that processes the order from now on.

At this point, the order executing officer also creates a physical file folder that follows the order when it goes from the OPD to the invoicing function and then back again. This folder is used to hold copies of acquisition orders to suppliers, invoices et cetera. The folder is also used to file the order when the order is closed. This is one of the problems with the order process today according to the order executing officers. They feel that there is too much paper work involved.

When an order has been chosen, the order executing officer looks in the e-mail inbox for the drawing that belongs to the order. The drawing is opened in Winner and it is checked for faults. The things that are checked are, for instance, that the products actually exists in the shape and measurements that they are drawn and that the salesman has defined which type of glass the customer wants on a cabinet with glass doors et cetera. To help the order executing officer to remember to check everything, a static checklist (OPD-1 checklist) is used in the Intranet. It is static in the sense that it has the same appearance regardless of the order. The checklist has one box for everything that has to be checked, e.g. worktops and colour of the white goods, these boxes are ticked off if the drawing is OK. If there is something wrong with the drawing there is a text field beside the box where the order executing officer can explain what the problem is and the salesman will be notified. The salesman then has to correct the faults and send the drawing back. The order is stopped until the drawing is corrected.

One complaint that came up during the interviews was that the text field where the order executing officer writes the message to the salesman is too small, so it is hard to get an overview of what has been written. Sometimes, the text field is not used and the order executing officer sends an e-mail instead. However, if the problem is very small the order executing officer often corrects the faults him- or herself and the salesman is not notified at all. This way the order gets processed faster, but the downside of this is that the salesman might make the same mistakes over and over again since he or she does not get any feedback.

When the drawing is approved by the order executing officer the acquisition orders to the suppliers are made. There are three different ways of sending an acquisition order, depending on the supplier. Nobilia can receive orders by EDI, but some orders are still sent to them by fax. Bosch Siemens Hushåll (BSH) has a web page where Noblessa can logon and submit an order, i.e. web-EDI, and for the other suppliers fax is used to

send orders. The advantage of EDI is that the acquisition order can be sent directly from Winner and the order executing officer does not have to print anything. However, it does not take much more time to fax the order, but a lot of time is saved at Nobilia with the EDI orders, see chapter 5.3.5.

When sending an order by fax the order executing officer has to fill in an acquisition order template, print out the acquisition order and a flyleaf and then fax them to the supplier. Copies of the acquisition orders are put in the folder. The orders to BSH are, as explained earlier, entered on their web page. This is a fast way of getting acknowledgement, but the order executing officers sometimes feel that they are doing the work of BSH.

To help the order executing officer to keep track of an order, a third checklist is now created. We will refer to this checklist as the “OPD-2 checklist”. In the OPD-2 checklist the order executing officer manually enters all the suppliers that will be used for the current order, and to each supplier a list of the ordered products is created. However, since Nobilia is the biggest supplier and every order contains a lot of different Nobilia products, it takes to much time to enter every product that is ordered from them. Therefore, only the product “kitchen” is entered in the list of products ordered from Nobilia. When the acquisition order is sent to a supplier, this is ticked off in the OPD-2 checklist. This checklist is also used later on when to tick off that the supplier has sent the acknowledgement and when the product is delivered, this way the tracking of the order is made much easier.

At this point the order executing officers can not do anything until the acknowledgements are received from the suppliers. Therefore, the invoice foundation, which was made by the salesman, is printed out and put into the folder and the folder is passed on to the invoicing function. The next chapter shows what happen at the invoicing function.

The order executing officer does not wait for the folder to come back from the invoicing function to report an acknowledgement, but he or she does neither report an acknowledgement as soon as it comes. When the order executing officer has time, he or she takes the pile of acknowledgements and checks that everything agrees with the acquisition order and if so, the box in the OPD-2 checklist is ticked off. This can be done anywhere from once a day till two times per week, depending on the amount of

spare time. If something is wrong with the acknowledgement the order executing officer contacts the supplier by fax or e-mail and tries to solve the problem.

When comparing the acknowledgement to the acquisition order it is actually easier if the acquisition order was sent by fax. This is because all the acknowledgements are received by fax. The order executing officers think it is easier to compare two papers to one another than if a paper is compared to an order that is on the computer screen, which is the case for EDI orders. This is the downside of EDI, and if the order is too complicated the order executing officer often prints the EDI order to facilitate the comparison.

When all acknowledgements from every involved supplier have been ticked off in the OPD-2 checklist, the order executing officer books fitter and fitting date in the Intranet. The order executing officer has to estimate how long time it will take to transport the kitchen to the customer and to fit it. This might be difficult and sometimes the fitter has too much time and sometimes too little. When the fitter has been booked, the Intranet automatically sends an e-mail to the customer with the fitting date and time. If the customer does not have access to e-mail, this information is sent by ordinary mail.

Thereafter, the order executing officer prints the work order, a complaint template and a fitting protocol and faxes them to the fitter. The work order contains a list of the included products, delivery date, address and a drawing of the kitchen. The complaint template is filled in and sent by the fitter to the OPD if something is wrong with any product or if something is damage during the transportation or the fitting. The fitting protocol is used as a legal document where the fitter describes how the fitting went. The fitting protocol is signed by the customer and the fitter. See chapter 5.3.4 for detailed information of the fitter’s tasks.

If everything goes without problems for the fitter, the order executing officer receives a fax from the fitter with the fitting protocol saying that everything went fine. The fitting protocol is then put in the folder which is filed and the order is closed in the Intranet. If something went wrong the fitter faxes a complaint to the OPD. The complaint process is however not discussed, since it falls outside the purpose of this thesis.

5.3.3 The invoicing function

As explained before, the tasks of the invoicing function are performed by an order executing officer that enters a different role. The employee performing these tasks waits until there is a pile of folders ready for invoicing and he or she performs the tasks two or three times a week.

The first thing to do is to take the invoice foundation from the folder, that was earlier printed by the order executing officer, and manually enter the information in an invoice template in the program Briljant. Actually two invoices are made, one part payment of 30 percent of the total amount, that has to be paid as soon as possible. The other invoice is for the remaining amount and has to be paid before the kitchen is delivered.

The two invoices are printed and sent to the customer. Two copies of every invoice are printed as well, one of the copies goes into the folder and the other one is put in a binder kept in the accounting department. This is the last task of the invoicing function and the folder is handed back to the OPD.

5.3.4 The fitter

As explained before, the order executing officer faxes the work order, a complaint template and a fitting protocol to the fitter. The fitter brings these documents along when he or she transports the kitchen from the Noblessa stock to the delivery address. The kitchen is fitted at the customer and afterwards the fitter checks the fitting to see that everything looks good. The fitting protocol is used so that nothing is missed. If something does not look fine this is entered in the protocol and a complaint is written. Finally, the fitting protocol is faxed back to the OPD and the order executing officer.

5.3.5 Nobilia

As has been discussed, Nobilia can receive acquisition orders both by fax and by EDI. In Figure 5.2 to Figure 5.5, only EDI orders are taken in consideration. This is because during the writing of this thesis Noblessa has been trying to, and succeeded to, send more and more orders by EDI. The goal is to send all orders by EDI within a near future. However, we will explain how a fax order is treated in order to stress the advantages of EDI.

The first thing that happens when Nobilia receives an order, by EDI or fax, is that the delivery date is estimated and an acknowledgement is sent to Noblessa. If the order was sent by EDI the drawing has to be converted so that their software, called COE, can read it. COE is an AutoCAD based program that has all of Nobilia's products in it, hence it is easy to use when drawing a Nobilia kitchen. The reason why Noblessa uses Winner instead of COE is because Winner provides a better 3D view of the kitchen, which is much desired when showing the drawing to the customer.

One problem with the conversion of the file to COE is that some faults arise. The cabinets are displaced a millimetre or two, for instance. Nobilia then has to correct these faults before the order can go to production planning. Nobilia is aware of these problems, but they argue that it would take a lot of time and effort to fix this software problem, and it does not take that much time to correct the faults in the drawing. Another problem when converting the files is when the name of the file contains the Swedish letters "å", "ä" or "ö". These letters then has to be changed manually by Nobilia. This is a rather easy problem to fix, Noblessa just has to stop using these letters. But Noblessa did not have any knowledge of this when we asked them in the interviews, which might be a sign of bad communication in the supply chain.

Nevertheless, it is much easier to correct the faults inflicted by the conversion than to process an order received by fax. When receiving an order by fax Nobilia has to redraw the kitchen from scratch in order to enter the order into their system.

Before the order processing department at Nobilia forwards the order to the next actor in the process, the order processor checks the drawing for fault. This is the third check of the drawings in the order process. We got the impression during our interviews in Germany that this check is very important for Nobilia because they do not fully trust Noblessa to do everything right. If any problem is discovered, the order executing officer at Noblessa is contacted and the problem is solved. The communication is in English, but since none of the involved persons have English as mother tongue, misunderstandings sometimes occur.

When the order is done in their order processing department the file is exported from COE into Nobilia's ERP system, SAP. Approximately one and a half week before the kitchen is to be delivered to the Noblessa stock, the order is planned into the production. Four or five days later, the order is produced and one or two days before

the delivery date the kitchen leaves the factory in Germany and is transported to Sweden.

Every product that leaves the Nobilia plant has a barcode and before the order is loaded onto the Nobilia trailers every products barcode is scanned. This helps Nobilia to control that every product belonging to the order is included in the transport. The barcodes are scanned when the products are unloaded from the trucks as well. If any product has been damaged during the transportation, this information is entered when scanning the barcode and a message is instantly sent to the plant in Germany and a new product is immediately produced.

When the process mapping interviews were performed, the central warehouse had not yet been taken into use. Thus, the kitchens were delivered to the local stocks. Actually, sometimes the transports go directly to the customer. This mostly happens when one order fills a whole trailer, for example when the customer is a building project.

5.4 Major problems of the current order process

As discussed in chapter 1.2 Problem discussion, the reason for the arisen problems with the order process is the fast growth of Noblessa. The order process is not adjusted to the sales volume of today with for example different software that can not communicate with each other and information filed in paper form in physical folders.

A reengineering of Noblessa's order process and an implementation of an ERP system would have little effect on the lead time, i.e. the time from the customer places an order until the kitchen is delivered and fitted. This is because the major part of the lead time is spent at Nobilia's plant and the purpose of this thesis is to look at Noblessa's order process. Nobilia is only taken in consideration in order to achieve synergy effects. However, the time that the customer has to wait for an order is not a problem, so the main purpose of reengineering the order process is not to shorten the lead time. This is one of the reasons why we have chosen not to measure cycle times and other time measurements of the order process, which is a step in the mapping methods of Keller and Jacka (1999) and Sharp and McDermott (2001). The other reason is that Noblessa's order process is in constant change, hence it is very difficult to measure the present cycle times of the process steps.

A reengineering would however make the employees' work tasks easier. The major problem today is that the order executing officers spend too much time on tasks that could be automated with an ERP system. Furthermore, they have tasks that are better performed by another actor. If the order executing officers' work tasks are facilitated, less time is needed for processing an order which means the OPD can process more orders per time unit. Nevertheless, every part of the order process has to be looked at and reengineered in order to take full advantage of the ERP system. It is not only the tasks in the OPD that can be automated or should be moved to another actor.

When looking at the process in the perspective of the enablers given by Sharp and McDermott (2001), some have greater improvement potential than others. The ones that have biggest improvement potential are *the workflow design*, *information technology* and *human resources*. The problems that we have discussed above are all related to these three enablers.

The enablers that we have found to have no, or very little, improvement potential are *motivation and measurements*, *policies and rules* and *facilities.* This is mostly because Noblessa is rather young company and therefore does not have policies and measurements that are out of date.

6 Analysis of the current order process

In this chapter we analyse the current order process from the perspective of the actions for improvement that are presented in chapter 4.3. The five different improvement areas are simplification and rationalisation, information exchange, automation, reconfiguration and cooperation. We will not discuss every possible change here, just the most important ones. See chapter 7 for all changes.

6.1 Simplification and rationalisation

Noblessa is a rather young company which means that there are almost no old process steps and activities that does not add any value to the process result. Furthermore, the implementation of the Intranet has made the order process already more or less adapted to an information system. There is however some things that we think could be improved.

First of all, we want Noblessa to use silent acknowledgement for the smaller suppliers that do not have the ability to respond via EDI. If not, these smaller suppliers will send the acknowledgements by fax which means that the order executing officer has to enter the information manually into the ERP system. Silent acknowledgments make the work for the order executing officers much easier.

Furthermore, there are some small things that can be improved. One example is to delete the invoicing function's task of putting one copy of the invoices in the binder kept in the accounting department, see chapter 5.3.3. Nobody at Noblessa could tell us why these copies were saved in the binder, thus we believe that there is no need to save them. Another example is to enlarge the text field in the OPD-1 checklist where the order executing officer enters information that is sent to the salesman. This is a problem today according to the order executing officers, see chapter 5.3.2.

6.2 Information exchange

The information exchange within Noblessa is already today rather good, due to the implementation of the Intranet. However, there are things that could be improved. Mainly, it is the ERP system that makes information even more accessible for the employees and improves the information flows between departments. One example is that the ERP system replaces Briljant and the Intranet with an accounting module and an order handling module that can communicate with each other. This means that the

OPD can easier get information from the accounting department, e.g. if the customer has paid the invoices.

Another thing that can be improved is the information exchange within the supply chains, essentially between Noblessa and Nobilia. Noblessa's ERP system could be linked to the ERP system of Nobilia. A more concrete example is when the kitchens are unloaded from Nobilia's trailers. Then the barcodes are scanned and information about the delivery and possible faults is sent to Nobilia's ERP system. This information could also be sent to Noblessa's ERP system, which means it is accessible at Noblessa as well without the need to enter the information manually.

6.3 Automation

This is probably the area where most gains can be achieved, especially for the OPD. First of all, the ERP system replaces the Intranet and Briljant with modules that can communicate with one another. This means that there is no need to enter information in, for instance, both the Intranet and Briljant. Thus, the invoicing function's task of entering information into Briljant is automated.

Another way of automating is that the ERP system can automatically send the acquisition orders once they are ready to the suppliers via EDI, E-mail or fax. Acquisition orders sent by fax do not have to be made, printed out and faxed as before. This saves time for the order executing officers.

There are a lot of other areas where tasks can be automated as well, too many to discuss them all here. See the new process model in chapter 7 for more details.

6.4 Reconfiguration

This is also an area with many improvement potentials. We have chosen to discuss the most important reconfigurations here in more detail. There are four bigger reconfigurations. These involve the tasks of:

- Sending the invoices to the customer.
- Converting the Winner drawing to COE drawing.
- Printing the fitting documents, i.e. work order, complaint template and fitting protocol.

- Booking the fitter.

We will now further discuss who should perform these tasks and how.

6.4.1 Sending the invoice to the customer

In the current order process, the invoices are sent by the invoicing function. When the entering of information into the accounting software is automated with the ERP system, the only task left for the invoicing function is to print and send the invoices. If this task can be automated or performed by somebody else, the invoicing function can be deleted which would bring fewer handoffs. Few handoffs are always wished for when trying to improve processes, as mentioned in chapter 4.3.1.

There are then three choices for which actor should perform this task, and there are three choices of method for providing the customer with the invoices. The actors are the sales department, the ERP system and the order processing department. The methods are handing over the invoices, sending them by E-mail and sending them by mail.

The fastest and most efficient way would be that the ERP system automatically sends the invoices by e-mail when all the needed information have been entered into the system. However, the customer might want a physical invoice of paper, and not just a computer file in their E-mail inbox. This means that the invoices have to be printed and given, or sent by mail, to the customer. If the invoices are printed from the ERP system at the same time as the sales checklist is printed at the sales department, the additional time is very little. Printing the invoices at the OPD and sending them by mail would take too much time and bring additional work to the order executing officers, who already has a lot to do. This last alternative is therefore rejected.

The alternatives left are that the salesman gives the invoices to the customer or that the ERP system automatically sends the invoices by e-mail. Which alternative is best depends on the customer’s preferences, namely if he or she wants a physical or an electronic invoice. The advantage of handing over the invoice, and the reason for our choice, is that we believe this task will help the salesman to remember to inform the customer of the payment conditions. This was a problem with the current order process. Letting the salesman handle this task is possible since the price on the kitchen does not change after the sales department.

However, the alternatives are about equal in our eyes. A different way of dealing with this problem is to give the customer an opportunity to choose how he or she receives the invoices.

6.4.2 Converting the Winner drawing to COE drawing

Today, the conversion to COE drawing is performed at Nobilia. But we want to move this task earlier in the order process. This is because the conversion detects faults in the drawing and we want to surface these problems as early as possible in the process. In the current order process, these faults are not detected until the order reaches Nobilia. When faults are detected at Nobilia it forces Noblessa to perform certain tasks more than one time and makes the order go back and forth between Nobilia and Noblessa more than necessary. Therefore, we want to move this task to the sales department. By performing the conversion as early as at the sales department this double work is avoided and the personnel have more time to perform their main work tasks. This is one of the most important changes in the new process model compared to the current process.

Another advantage of converting the drawings to COE at Noblessa's sales department is that the customer is still present when the salesman is correcting the faults in the drawing. The customer can then give their approval about the changes instantly, and there is no need to contact him or her later in the process.

6.4.3 Printing the fitting documents

This task is performed at the OPD in the current order process. The order executing officer prints the work order, the complaint template and the fitting protocol and then faxes them to the fitter. This involves unnecessary work, especially now when the ERP system provides the information to every Noblessa employee. If the person who needs the documents prints them, then there is no need for the faxing task.

There are two alternatives of who should print these documents. The first one is that the fitter performs this task. The other alternative is brought by the opening of the central warehouse. The central warehouse will call for new work tasks and hence, new actors in the order process. One of them is the actor *warehouseman* who has the responsibility to help the suppliers to unload their trucks and also to load the goods on the trucks going out to the customer. The central warehouse and the changes it brings

are more thoroughly discussed in chapter 7.1.2. The warehouseman is the second alternative of who should print the fitting documents.

If the fitter prints them, they will follow him or her to the fitting location. If the warehouseman prints the documents, they will follow the physical order, i.e. the kitchen, from the central warehouse to the customer. The physical order will always go to the fitting location, but the fitter might fall ill and a substitute fitter has to be called in. Thus, the alternative of letting the warehouseman perform this task is preferred. However, it is important to have a standardised way of attaching the documents to the order so they are easy to find, e.g. a plastic case that follows the order at a predetermined place.

6.4.4 Booking the fitter

As discussed above, the central warehouse brings new actors. Besides the warehouseman, there is also a need for the actor *route planner* with the new central warehouse in order to make the transports more effective. If the route planner books the fitter it enables him or her to synchronise fitting date and transportation route, which makes the routes shorter and more effective. For instance, customers in one region get their kitchens fitted one day, and the customers in another region the day after, with shorter transportation distance as result. Another benefit is that if a fitter has two or more kitchens to fit in one day there is a shorter distance to go between the customers.

It could be argued that the OPD should still perform the task of booking fitters, like in the current order process, and be given the task of route planning as well. This would also bring the advantage of the same person planning the routes and booking the fitter. Furthermore, it would decrease the number of handoffs since the route planning function is deleted. As discussed in chapter 4.3.1, a low number of involved actors, thus fewer handoffs, is always desired when trying to improve a process. But we maintain that these tasks should be given to a separate function since the task of route planning falls outside the order executing officers' field of competence. The advantage of letting a person who is specialised in logistics and route planning carry out these tasks is too big to disregard.

6.5 Cooperation

Many of the actions for improvement that we just have discussed can not be carried out if the level of cooperation and integration in the supply chain is not improved. Thus, this is one important improvement area for Noblessa. One example is the silent acknowledgements discussed in chapter 6.1. Silent acknowledgements demands a high level of trust between the companies, and it might take some time before Noblessa and its suppliers are ready to use this. Another example is the move of the task of converting the Winner drawings to COE drawings. First of all, Nobilia have to be willing to give away this task, but they also have to share experiences and knowledge with Noblessa in order to make this work as good as possible.

Nobilia is the most important supplier to integrate and to cooperate with since it is the biggest supplier. Moreover, the conditions for cooperation with them are very good since Nobilia is the main owner of Noblessa. The cooperation between Noblessa and its suppliers will be more thoroughly discussed in chapter 8.1, where our recommendations of what should be done are presented.

7 Process model for Noblessa's new order process

In this chapter we present the process model that we recommend Noblessa to use when the ERP system is implemented. First, we discuss the introduction of the ERP system and the use of the central warehouse, which are the main differences between the new process model and the current order process. Then, we present the workflow of the new process model and discuss its potential improvements and possibilities, and finally, the advantages with the new process model are briefly discussed.

7.1 The main differences

There are two main differences with the new process model compared to the current order process. These are the introduction of the ERP system and the use of the central warehouse. We will now explain the differences that the ERP system and the central warehouse bring.

7.1.1 The ERP system

The introduction of the ERP system makes information available to the whole company. Concerning the order process, the ERP system replaces the Intranet and Briljant. The ERP system enables communication between the different department's software and automates some work tasks. If fully utilised, it can also enable communication between Noblessa and its suppliers, essentially Nobilia.

Concerning the actors, there are two differences that the ERP system brings. The first one is that the actor *Intranet* has been replaced by the actor *ERP system*. Furthermore, the ERP system contains, among other things, an accounting module which means that the invoicing information does not have to be entered manually into separate software like Briljant. This leads us to the second difference concerning the actors, the manual work of invoicing is now automated and the invoicing function can be deleted. The invoices still have to be sent to the customers, this is solved by giving the invoices to the customer when he or she places the order at the sales department.

7.1.2 The central warehouse

Regarding the actors, the central warehouse brings two differences. The first one is the introduction of the actor *route planner*. In the current process, the fitters usually transport the kitchens from the local stocks to the customers, but sometimes the

Nobilia trailers goes directly to the customer. The new central warehouse creates conditions for more effective transports. All suppliers will deliver to the central warehouse and all transports to the customers will start from it. The exceptions are the deliveries to the shop in Malmö, the ones to the retailer in Gävle and the deliveries from Nobilia when one customer can fill a whole Nobilia trailer, e.g. building projects. To take full advantage of this new possibility that the central warehouse brings, a route planning function is necessary to make the transports as effective as possible. Thus, there is a need for the actor route planner.

The second difference about the actors is the new actor *warehouseman*. The warehouseman's work tasks include helping the suppliers unload their goods from the trucks, picking the stocked products and loading the goods on the trucks that transports the kitchen to the customers.

Actually, the central warehouse brings a third actor as well, which is not included in the swimlane diagrams. This is an external logistics firm that is called in to handle the transports from the central warehouse to the customers. However, transports to customers close to Norrköping and the central warehouse might be performed by the fitter. We have chosen not to include the external logistics firm as an actor in the swimlane diagrams, because it only performs one task, which is to transport the kitchen to the customer. This is described in the text instead.

Furthermore, the central warehouse is used as a stock for cheap, high-quantity standard products. As mentioned above, this means that the warehouseman gets one more task to perform, which is to pick the stocked products before sending an order. The other function of the central warehouse is that it is used as a merge-in-transit point for the non-stocked products, e.g. the products from Nobilia and white goods from Siemens. With a merge-in-transit point we mean that the products are not stocked in warehouse. They are just kept there for a short period of time until all the products included in an order have been delivered to the warehouse. The order is then transported to the customer.

The products kept in stock have to follow a different workflow model than the non-stocked products. The non-stocked products are not ordered until after the customer places his or her order at the sales department, while the stocked products are ordered continuously to keep a certain stock level. We will only present the process model of the order process for the non-stocked products, for instance the products from Nobilia.

This is because the need for a process model of the order process for stock products has arisen during the writing of this thesis, and to design this process model is not a part of this thesis' purpose.

7.2 The workflow

The workflow of the process model is presented in Figure 7.1 to Figure 7.6. It is only presented at the milestone level because the handoff level swimlane diagram does not give a clear picture of the differences in the workflow. We use two more figures to describe the new process model compared to the swimlane diagrams of the current order process. This is because these swimlane diagrams are drawn in more detail. As discussed earlier in chapter 4.5, detailed swimlane diagrams are important when presenting a new process model. This is because the model is used in the process implementation and as requirements specification for the ERP purchase.

We have chosen to describe the new process model in a chronological order. However, we still divide the workflow between the major actors. The exception is Nobilia which is not discussed until the end of this chapter. The other major actors are the sales department, the order processing department, the route planner, the warehouseman and the fitter. We will present the workflow in one figure at the time in order to make it simple for the reader to follow it. If the reader wants to see the process maps together, they are all presented in appendix 1.

This process model has the same starting and ending event as the current order process. It starts when the customer places an order at the sales department and it ends when the order is filed and closed at the OPD.

7.2.1 The sales department

The salesman has made drawings of the kitchen in the CAD software Winner before the workflow of the new process model starts, just like in the current order process. Winner is still used since it is important to give the customer a good 3D view of the kitchen.

As mentioned above, the new process model has the same starting event as the current order process, which can be seen in Figure 7.1. The customer places the order in the same way as before, but this is as far as the similarities goes. The second task for the salesman is to convert the drawing that has been drawn in Winner to COE drawings,

which is the AutoCAD software that Nobilia uses discussed in chapter 5.3.5. The conversion takes just a few minutes.

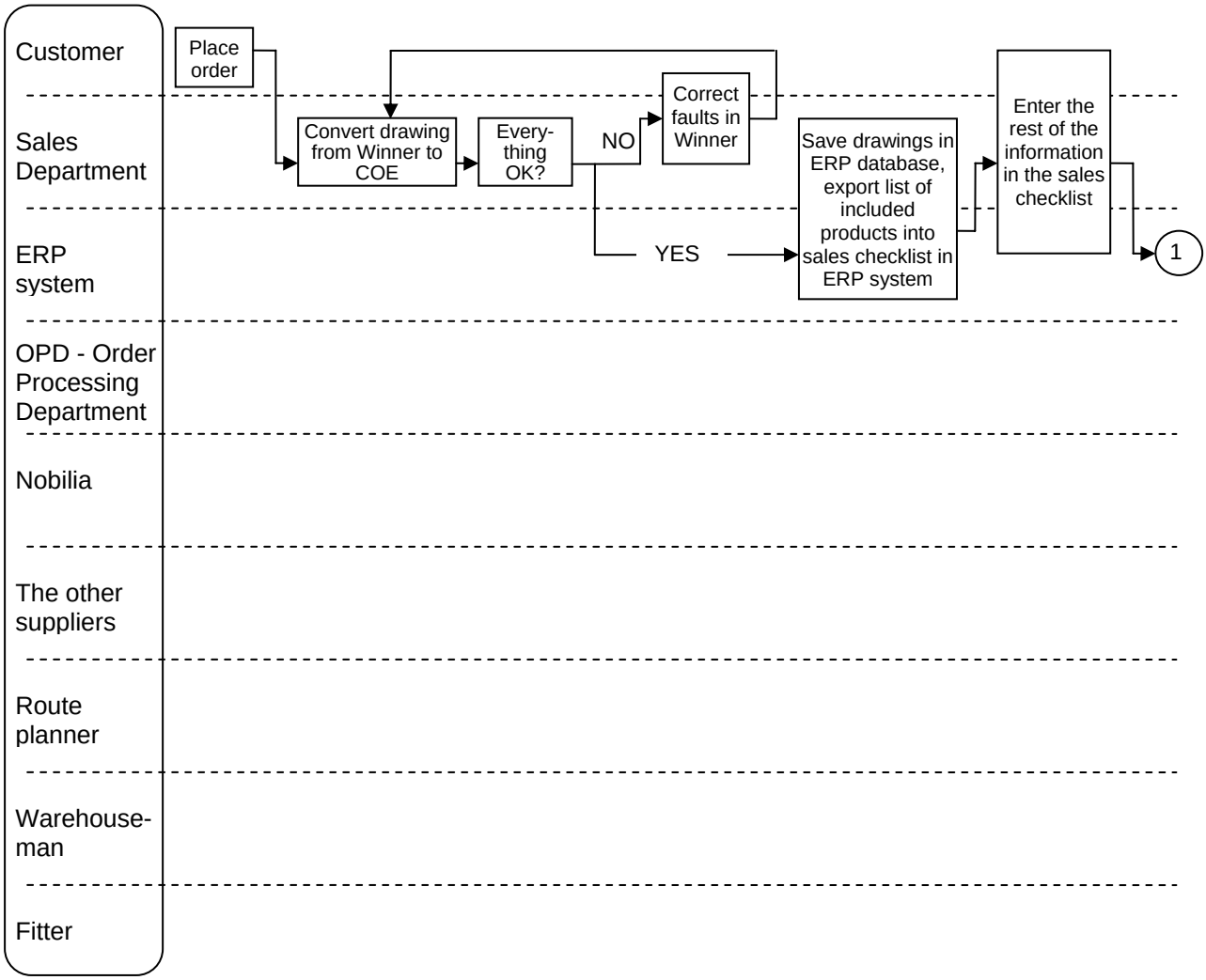


Figure 7.1: The milestone level diagram of the new process model, part 1.

If the conversion from Winner detects any faults in the drawings, these faults have to be corrected in Winner and the drawings converted to COE once again.

If there are no faults in the drawing, or when all faults are corrected, the drawings are saved in the ERP system's database. Both the Winner and the COE drawings are saved. The Winner drawings will not be used later in the order process if everything goes fine. They are only used if the drawings have to be changed later on.

Besides the drawing, Winner also contains a list of the included products in the order. This list is imported into the ERP system and becomes the basis for the sales checklist. We want to use a sales checklist in the new process model as well, since we think it is

a good way to ensure that the salesman and the customer have understood each other. However, in the current order process' checklist, the included products have to be entered manually. This is now done automatically by the ERP system. Nevertheless, everything still has to be checked, so misunderstandings are avoided.

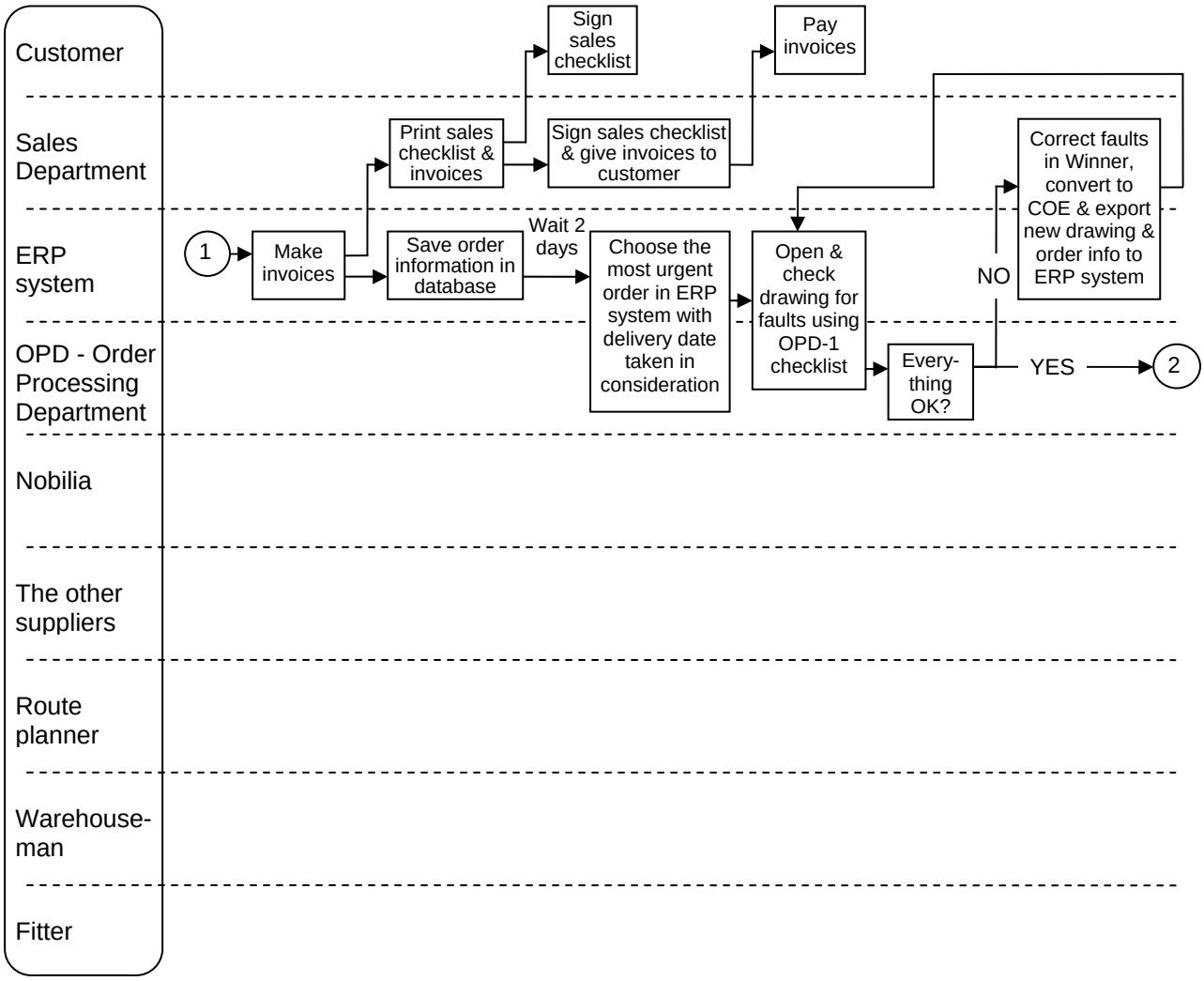


Figure 7.2: The milestone level diagram of the new process model, part 2.

When the sales checklist is complete, the ERP system automatically makes the invoices from the information in the sales checklist, which is the first task in Figure 7.2. The sales checklist and the invoices are printed and the checklist is signed by both the customer and the salesman. The invoices are then handed over to the customer directly and the salesman informs the customer of the payment conditions. If the customer prefers, he or she can receive the invoices by E-mail instead. At the same time as printing the sales checklist and the invoices, all information of the order is automatically saved by the ERP system in its databases.

7.2.2 The order processing department

One order executing officer is responsible for an order throughout the whole process. This is because if something goes wrong, it is easier for the customer to contact one person who has the responsibility for the order. Furthermore, if there is a need for more than one contact, it is better to contact the same person every time. This means that if something goes wrong later on in the process, e.g. that something is wrong with the delivered products, the responsible order executing officer is contacted and not the whole OPD.

The ERP system provides a list of the orders that has not yet been treated by the OPD. The orders are sorted with the most urgent one at the top, with the wanted delivery date taken in consideration. As can be seen in Figure 7.2, the order executing officer has to wait two days after the order is finished in the sales department. The reason for this is that Noblessa has a policy that the customer has two days to change the order. If a customer has a change of mind on an order that has already been treated by the OPD, the same work tasks have to be performed all over again. To eliminate this risk, the order will not appear in the OPD list of untreated orders until after two days.

When the order executing officer has chosen an order, the COE drawing is checked for faults. The same static checklist as the one used in the current order process, the OPD-1 checklist, is still used as support. However, there is one change compared to the current OPD-1 checklist. The change has to do with the problem discussed in chapter 5.3.2, that the text field where the message to the salesman is entered is too small. In the new ERP system the text field is bigger in order to give the order executing officer a better overview of the written message.

If the order executing officer finds any problems with the drawing, he or she notifies the salesman, who drew the kitchen and received the order, via the ERP system. The salesman then has to open the Winner drawing once again, correct it and convert it to COE, and then save it in the ERP system. The ERP system notifies the order executing officer when the new drawing is saved in the database and the order is available again. The order will be available instantly, there is not a two days waiting time this time.

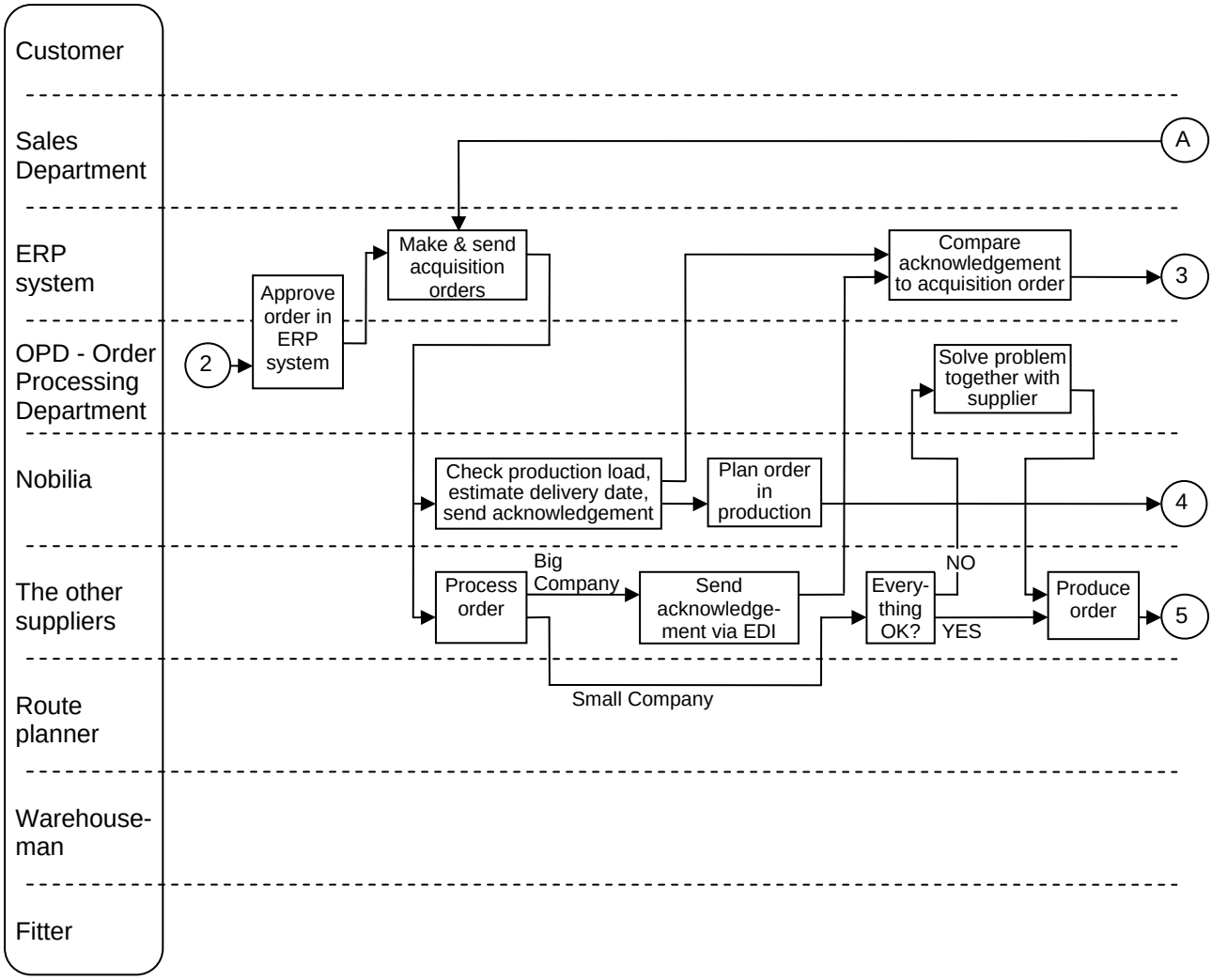


Figure 7.3: The milestone level diagram of the new process model, part 3.

When everything is OK in the drawing, the order executing officer approves the order in the ERP system, which can be seen in Figure 7.3. The ERP system then automatically makes and sends acquisition orders to the suppliers that are used in the order. Every acquisition order is sent by the ERP system, regardless if the supplier receives orders by fax, EDI or in another way. The orders sent by web-EDI might cause a problem since they demand manual work, e.g. the orders to Bosch Siemens Hushåll. Noblessa have to initiate a discussion with BSH about creating an EDI link between them. This is further discussed in chapter 8.1.2.

When the suppliers have received the acquisition orders they have to check their production load, estimate delivery date and send an acknowledgement back to Noblessa. Concerning Nobilia, this is preferably done automatically. In other words, Nobilia's ERP system have information of their production load and can estimate the

delivery date and automatically send an acknowledgement back into Noblessa's ERP system. If this is not possible, Nobilia has to check production load and estimate delivery date manually, but the acknowledgement is still sent back via EDI directly into Noblessa's ERP system.

Acknowledgements should be sent via EDI directly into Noblessa's ERP system from the other suppliers as well, when it is possible. These companies that have the resources to respond via EDI are referred to as "Big Company" in Figure 7.3. If the suppliers are too small and do not have the ability to respond via EDI, they are referred to as "Small Company" in the swimlane diagram. These smaller companies use silent acknowledgements. In other words, the supplier does not contact Noblessa unless there is something wrong with the acquisition order. Noblessa has to suggest a delivery date based on experience, and the supplier only contacts Noblessa if there is no possibility that they can deliver in time. If something is wrong with the order, e.g. wanted delivery date or wanted quantity will not be reached, this has to be solved by the order executing officer together with the supplier. When everything is alright, the order is produced by the supplier.

The acknowledgements that are sent by EDI are automatically compared to the acquisition orders and checked for faults by the ERP system. If everything is OK, the order status is automatically updated so the ERP system knows that the acquisition order is acknowledged. If the ERP system detects any faults when comparing the acknowledgement to the acquisition order, it marks the faults in the acknowledgement so they are easy to find and the responsible order executing officer is notified. The order executing officer then has to contact the supplier and solve the problem. When everything is OK, the order executing officer updates the order status in the ERP system. This might be seen as the OPD-2 checklist used in the current order process. When all acquisition orders are acknowledged, checked and OK, the order appears in a list in the ERP system. This list contains the orders that are ready for route planning and fitter booking.

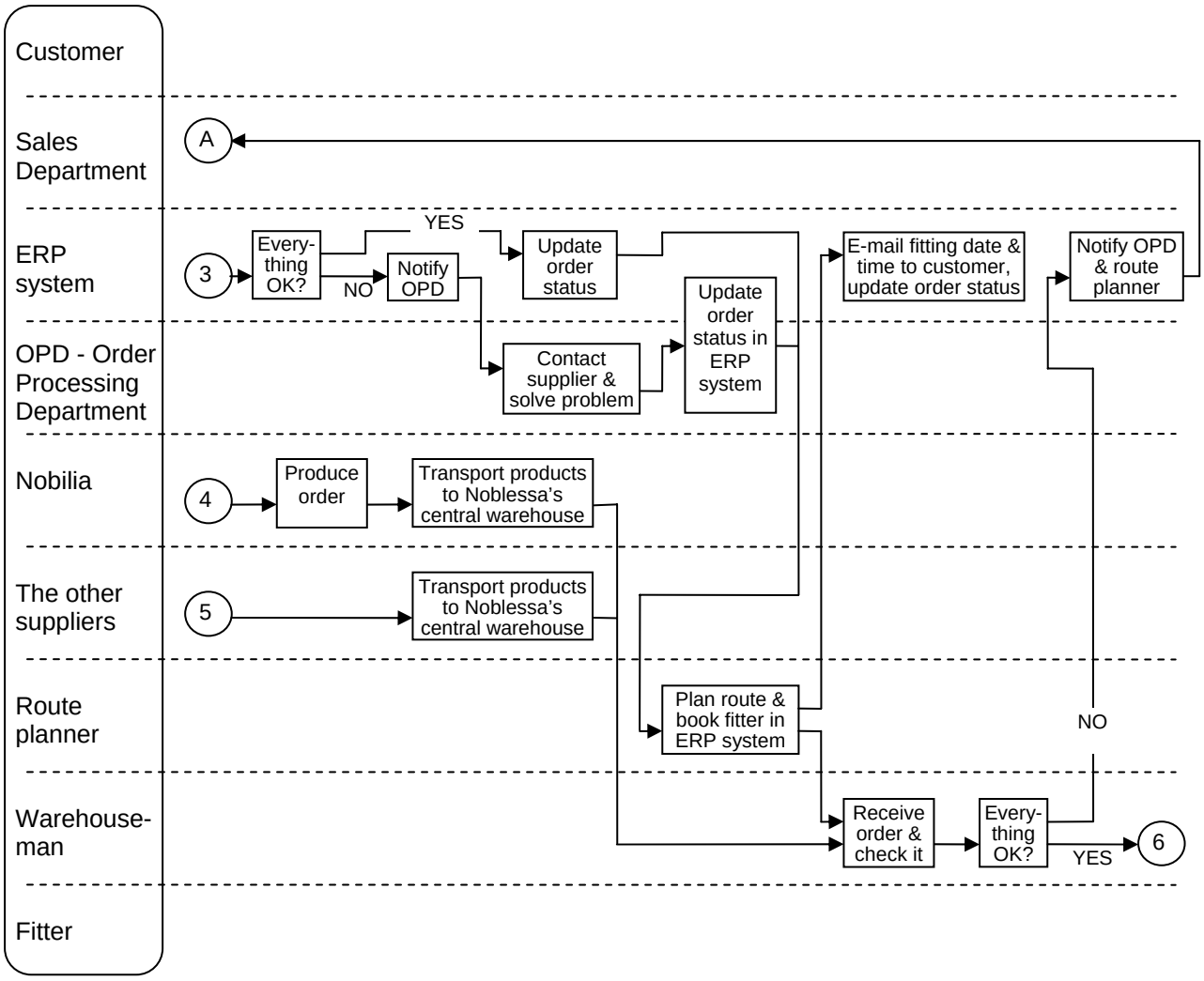


Figure 7.4: The milestone level diagram of the new process model, part 4.

7.2.3 Route planner

As mentioned earlier, the central warehouse brings two new actors to the order process; the route planner and the warehouseman. The first one to get in contact with the order after the OPD is the route planner. His or her first task is to check the list of orders that are ready for route planning and fitter booking. He or she chooses an order based on delivery date and puts it in a suitable route and books the fitter. If no suitable route exists a new route has to be created.

After the route planner has booked fitter in the ERP system, an E-mail is automatically sent to the customer with information about fitting date and time. If the customer does not have access to E-mail, the information is sent by ordinary mail just like in the current order process. The order status is also updated so the fitter can see the order's fitting date and time in the ERP system. Then the order has to wait until the goods from each and every involved supplier have been delivered to the central warehouse.

7.2.4 Warehouseman

One or more warehousemen are responsible for the warehousing function, which is the next stop for the order. When a supplier delivers products, the warehouseman has to receive the delivery and check it so that everything is OK. The deliveries from Nobilia is however an exception. As mentioned in chapter 5.3.5, the drivers of Nobilia's trailer always check the products and scan the barcodes when the truck is unloaded. If something is wrong, a message is instantly sent to the factory in Germany and a new product is produced immediately. In the new process model, the information of which products were delivered and if something was damaged is sent to Noblessa's ERP system as well. This way, the route planner is notified that one or more of the included products in the order will be delivered late. If the delayed products are necessary for fitting the kitchen, the fitting date and the route have to be changed.

As far as possible, the same method is used for the other suppliers as well. However, some information has to be entered manually. This is because some suppliers are small and do not have the resources to use barcodes so Noblessa can automatically enter information into the ERP system. The warehouseman then has to enter information of the delivered product, e.g. order number, product number and delivered quantity, so that the ERP system can update the order status. If something is wrong with the delivery, this has to be entered in the ERP system as well. The ERP system then automatically sends a new acquisition order for the damaged or missing product or products to the supplier. It also notifies the route planner that the order is delayed so he or she can make the adequate changes in fitting date and routes. This makes this part of order go back to the ERP system task "Make and send acquisition orders" in Figure 7.3, and from there go through the workflow once again. If the damaged or missing part is necessary for the fitting, the rest of the order that was alright has to wait in the central warehouse and the customer is also notified that the kitchen will not be delivered in time. If not, the rest of the order can proceed in the process and the damaged or missing part will be delivered and fitted afterwards.

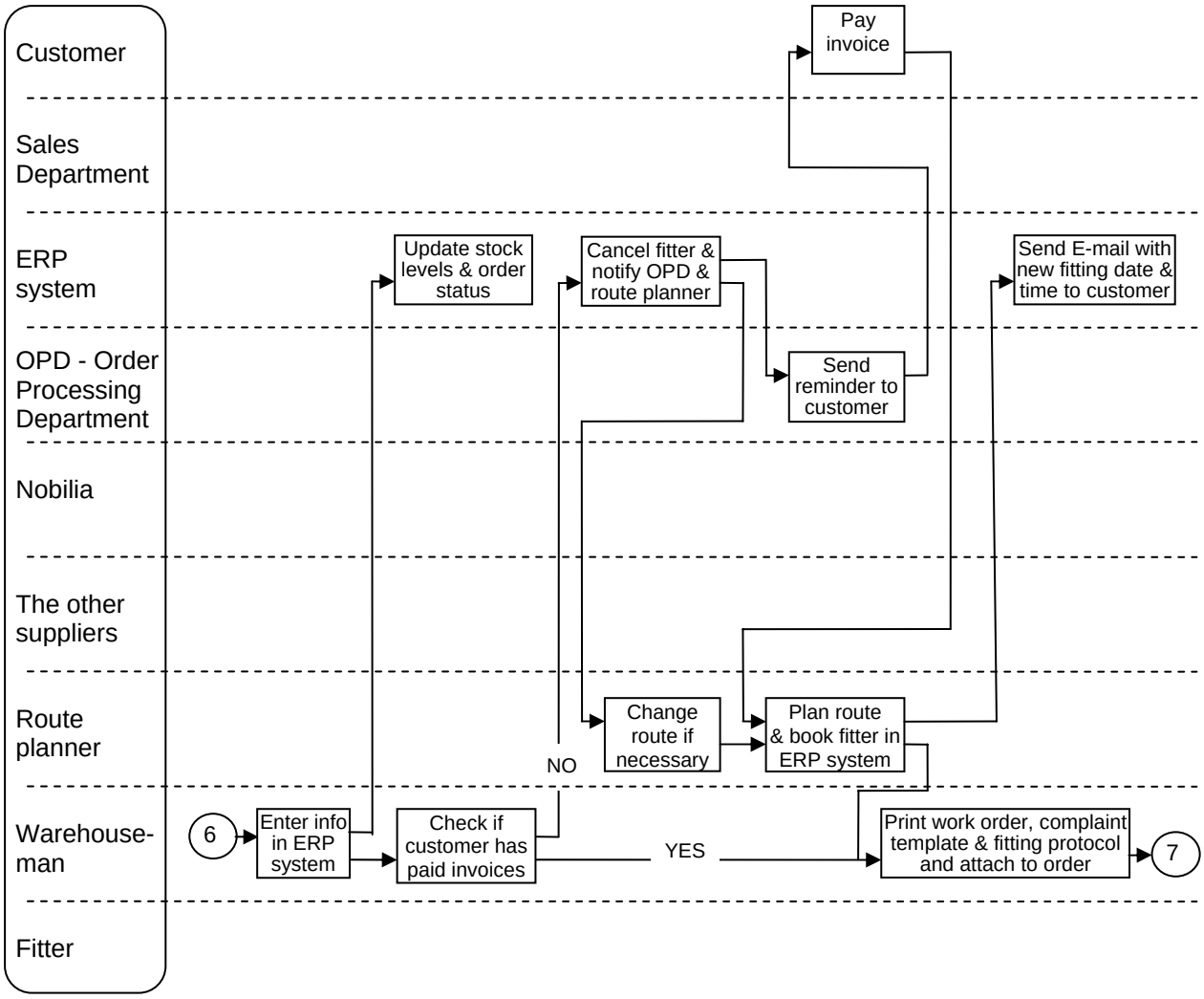


Figure 7.5: The milestone level diagram of the new process model, part 5.

Before the warehouseman can proceed with his or hers chores, he or she has to confirm that the customer has paid the two invoices. If the invoices are not paid, the workflow has to make a detour, as can be seen in Figure 7.5. The first thing that happens then is that the warehouseman notifies the responsible order executing officer and the route planner via the ERP system. The fitting is at the same time automatically cancelled by the ERP system so the fitter knows that the fitting will be delayed. The order executing officer at the OPD then sends a reminder to the customer who has to pay the invoice immediately. In a parallel flow the route planner makes the suitable changes in the routes now that there is one less order to transport in one particular route. The ERP system gets automatically updated when the invoices are paid and the route planner is then notified. The route planner then plans a new route for the order and books fitter once again. The last task on this detour is that the ERP system sends an E-mail to the customer with the new fitting date and time.

Regardless if the customer had paid the invoice in time or if the OPD had to send the customer a reminder, the next task is for the warehouseman to print the documents belonging to the order. These documents follow the order to the customer since they are necessary for the fitter to perform his or her job later on. The documents are work order, complaint template and a fitting protocol.

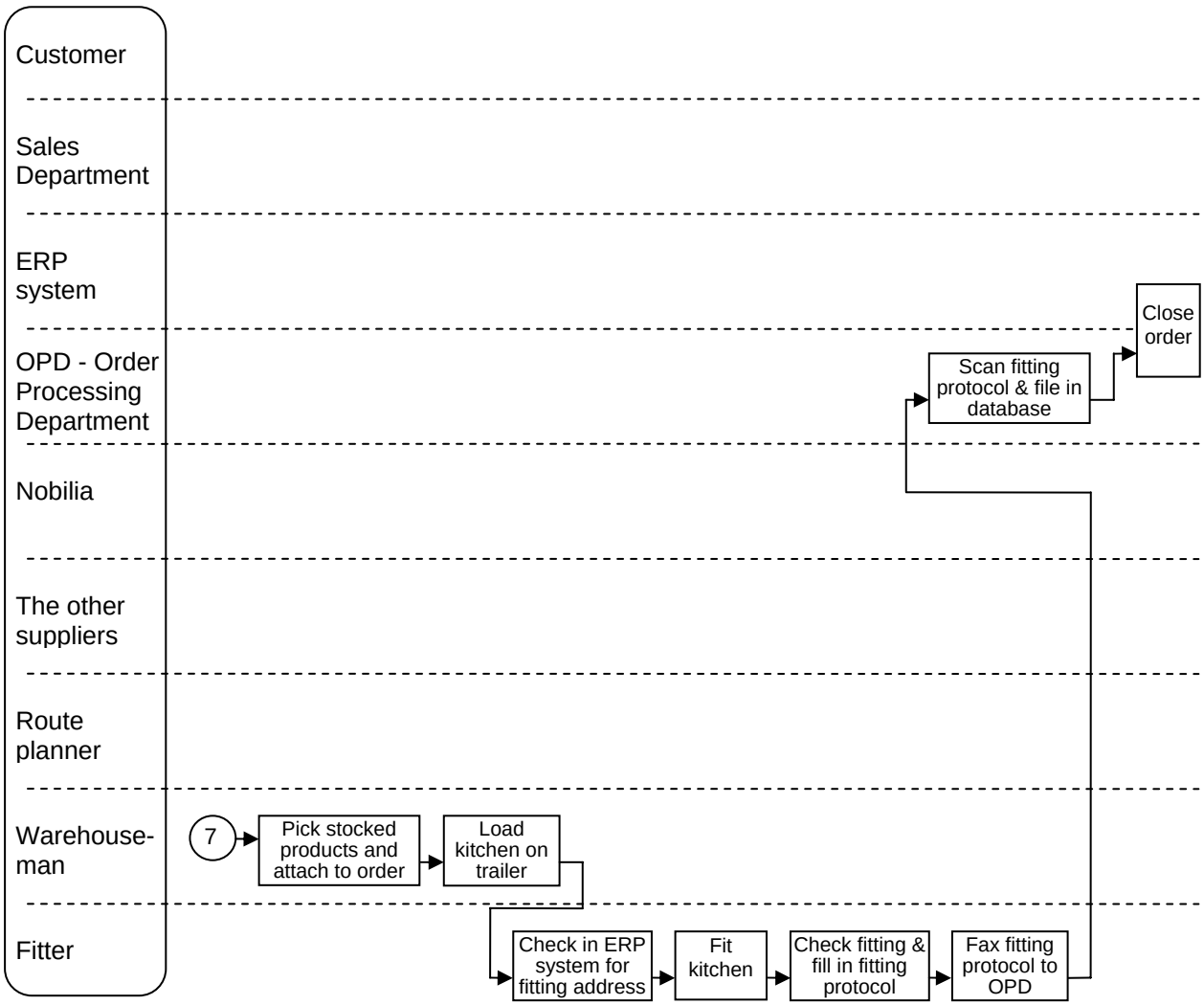


Figure 7.6: The milestone level diagram of the new process model, part 6.

The next task is for the warehouseman to pick the stocked products and include them with the rest of the products in the order, see Figure 7.6. The work order is used to see which products he or she has to pick. The last thing the warehouseman does is to help the external logistics firm to load the kitchen onto the trailer.

7.2.5 The fitter

Every Noblessa fitter has a Noblessa sales shop as starting point. This is where the first task is performed which is to check in the ERP system for what orders to fit. The fitting address, date and time is checked. As mentioned above, if the customer lives close to the central warehouse, the next task might be to transport the kitchen to the customer. Normally, however, the next task is to go to the customer and unpack the products and fit the kitchen. After the fitting, the fitting protocol is filled out and signed by both the customer and the fitter. If any product is damaged the complaint template is filled out and faxed to the OPD once back at the Noblessa sales shop. The complaint process is a different process and is not treated in this thesis.

Back at the Noblessa sales shop, the fitter faxes the fitting protocol to the OPD. The order executing officer then scans the fitting protocol and saves it in the ERP systems database. The last task is for the order executing officer to close the order in the ERP system.

7.2.6 Nobilia

The difference of Nobilia's role in the new process model is that the order goes directly from Noblessa into the production and transportation planning department. This is made possible by converting the drawings to COE already at Noblessa. Today, in the current order process, the drawing of the order is first converted into COE at one department and then processed by the order processing department. The only function the order processing department would have in the new process model would be to check the drawing once again for faults. But the drawings have already been checked by the salesman and the order executing officer at Noblessa, and we argue a third control would cost more than it would pay. Another benefit from bypassing the order processing department at Nobilia is that there are fewer handoffs throughout the supply chain.

From the production and transportation planning department there are no changes in Nobilia's assignments compared to the current order process, therefore this will not be discussed here. The only difference is that all transports from Nobilia go to Noblessa's central warehouse.

7.3 Advantages of the new process model

The most important change that brings most improvements in the new process model is of course the implementation of the ERP system. The ERP system automates a lot of work tasks and hence makes the work easier for the employees. Furthermore, it enables the removal of actors which means that there are fewer handoffs and information is accessible for all of Noblessa's employees. Actually, there are more handoffs in the new process model, but this is unavoidable due to the introduction of the central warehouse.

Besides the advantages that come with the ERP system implementation, some tasks have been moved from one actor to another because it is more suitable to perform them there. Moreover, unnecessary tasks have been removed, e.g. filing papers in a physical folder.

The new process model and the implementation of the ERP system make above all the order executing officers' job much easier. They are now prepared for an increasing sales volume and they can process more orders during the same period of time.

The salesmen's work becomes a little more complicated with the additional task of converting the drawings from Winner to COE. However, this is done practically automatic, and a lot of the other tasks of the salesmen have been automated so the total work is about the same in the new process model. Furthermore, the personnel at the sales department seemed to have more time to spare than the order executing officers.

8 Conclusions and recommendations

In this chapter, we present our conclusions and recommendations of what should be done in order to make the new process model work as good as possible. It also contains recommendations of future projects that have to be performed in order to make the process reengineering and ERP system implementation possible.

8.1 Integration and cooperation

During the mapping of the current process we found that there is a lack of trust and integration between Noblessa and Nobilia. But still, Nobilia is the supplier who Noblessa has the most integration with. Furthermore, Nobilia is the main owner of Noblessa, the conditions for integration and cooperation are therefore very good. This is an opportunity that should be taken advantage of.

Nevertheless, the integration and cooperation with the other suppliers should not be forgotten. But even though there are many advantages with integrating the suppliers, it is not economically defendable to have that kind of cooperation with each and every supplier. Noblessa has to focus on the suppliers that can bring the biggest improvements for the supply chain.

We will now further discuss a few topics concerning the integration and cooperation between Noblessa and its suppliers.

8.1.1 The cooperation between Noblessa and Nobilia

As mentioned above, Nobilia is the main owner of Noblessa and the conditions for integration and cooperation should therefore be very good. However, we discovered that the communication between the companies is not always perfect. One example is that we found out that Nobilia uses the software COE at the same time as the employees at Noblessa, and Noblessa had no knowledge about the problems the conversion brings.

Furthermore, we got the impression that the work force that we interviewed at Nobilia was a little reluctant to give away work tasks since they did not trust that Noblessa would do everything right. The interviewees thought that Noblessa would interfere with Nobilia's order process. One example is the personnel at Nobilia's OPD who argued that they should not be bypassed because they felt there is a need for an extra

check of the order before it goes to production planning. However, we believe that Noblessa's personnel are just as qualified to perform this task and bypassing Nobilia's OPD would bring great improvement to the whole supply chain. With an open dialogue between the two companies, where experience is shared, we believe that Nobilia and Noblessa can build up a mutual trust for each other and solve any problems that may arise.

One thing, with which Noblessa will need help from Nobilia, is the problems the conversion from Winner to COE brings, i.e. faults in the drawing. Since COE was developed by Nobilia, they have the knowledge necessary for fixing these software problems. As Noblessa's sales volume increases, the time needed to correct these faults in the drawings will of course increase as well. Thus, we recommend Noblessa and Nobilia to deal with the underlying reasons to the arising of these faults and solve the problem.

However, Noblessa's sales volume is only approximately 0.5 percent of Nobilia's total produced volume. The incitement for Nobilia to increase the cooperation and integration with Noblessa is therefore very small. This means that Noblessa has to take the main responsibility for the integration. But as mentioned in the first chapter, Noblessas ambition is to keep growing on the kitchen market in Sweden, the goal is a market share of 10 percent within 5 years compared to 2 percent today. With the increasing sales volume, the potential of an integrated supply chain might be big in the future. Another suggestion is for Nobilia to use Noblessa as a pilot project for supply chain integration, where new ideas and thoughts are tested.

To sum up, we recommend Noblessa and Nobilia to further develop the cooperation between them. Sharing experiences and integrate the supply chain are things that both companies would benefit from.

8.1.2 The cooperation between Noblessa and the other suppliers

The integration and cooperation between Noblessa and the other suppliers should also be analysed and improved. However, it is important not to bite off more than one can chew, i.e. all supply chains can not be focused. The ones that have the greatest improvement potential have to be focused.

One thing that we would like to discuss more is the EDI link to Bosch Siemens Hushåll, which is mentioned in chapter 7.2.2. As discussed, today Noblessa places

their orders to BSH using web-EDI, but we want them to try to create an EDI link between them. This is because we want the ERP system to make and send all acquisition orders automatically, which is not possible with web-EDI. But is this the best solution, and what would happen if it is not possible to create an EDI link between the two companies?

Noblessa can order Siemens white goods via Nobilia from Siemens in Germany as well as from BSH, which means that they have two suppliers delivering the same products. Christopher (1998) and Mattsson (2002) argue that a company should try to decrease the number of suppliers if possible, because it is easier to build up good relationships with fewer suppliers (see chapter 4.2.5). Thus, it might be a better idea to only use one supplier for Siemens products, Nobilia or BSH.

One advantage of BSH is that they can provide the user's guide in Swedish. When ordering from Nobilia, however, the Siemens white goods and the Nobilia products are loaded onto the same truck, which makes the transportations more effective. This should however be analysed deeper and further investigated before making a decision.

Another thing that we would like to further discuss is the use of silent acknowledgements. We believe that this is a very good solution for the smaller suppliers when the acknowledgements otherwise have to be sent by fax and can not be automatically checked by the ERP system. In order to make this possible, Noblessa have to build up and maintain a trust with the suppliers. This might be very difficult to do, and might take a long time, but the advantage of less work is considering.

8.2 Implementing the ERP system

The ERP system is an essential part of our process model for the new order process, and it brings many positives effects like automation of manual tasks and better availability of information, among others. But Noblessa also has to be aware of the difficulties that an ERP implementation brings. First of all, the cost of implementing an ERP system is very big. Second, it is going to take time to implement the system and learn how to use it, and it might be necessary to use both processes during the implementation. Noblessa should take advantage of Nobilia's experience in this area, since Nobilia already has implemented an ERP system. With the help from Nobilia it may also be easier to integrate the companies' ERP systems.

A very important thing for Noblessa, not just for the ERP system implementation, but also for the process reengineering, is to have the employees behind the project. If Noblessa's employees are not willing to change their work tasks and learn how to use the ERP system this project will most certainly fail. Thus, it is very important that Noblessa's management leads the process reengineering and ERP system implementation and succeeds to convince the rest of the company that the project will facilitate the work and bring huge benefits to the company.

This thesis has prepared the order process for an ERP system implementation. Nevertheless, the rest of the company's processes have to be mapped, analysed and configured as well in order to take full advantage of the ERP system. One example is the complaint process and another example is the work of the accounting department. Furthermore, the new central warehouse brings additional processes like for example the order process for stock keeping units.

8.3 Continuous improvements of the order process

After the new process model has been taken into use and the ERP system has been implemented, Noblessa has to keep working continuously with the order process. As discussed in chapter 4.2.4, continuous process improvement is an important complement to business process reengineering. Furthermore, if a process is left to be after a reengineering, there is a good chance that it will get worse. The environment is in constant change, and if Noblessa wants to be top of the line, the order process has to be continuously improved along with the changing environment.

We leave it to Noblessa which continuous improvement method to use. We have discussed two in the Frame of reference, the PDSA cycle and benchmarking. Both methods would work, but there might also exist another method that is more suitable for Noblessa. Whatever method is used, the employees start thinking more about the process if it is continuously improved and more problems will be surfaced and treated.

8.4 Fulfillment of the thesis' purpose

Finally, we want to discuss if the thesis has fulfilled its purpose. We have taken the use of an ERP system in consideration and we do believe that the process model is detailed enough to work as a foundation for a requirements specification for the ERP system purchase. But will the process model manage to deal with the expected expansion? Noblessa's goal is to reach a 10 percent market share within five years, compared to a

2 percent market share today. This is a rather big expansion which will demand a lot from the order process.

Our recommended process model has moved tasks from one actor to another because they are more suitable to be performed there. Furthermore, a lot of manual tasks have been automated and unnecessary actors have been removed. We believe that all these improvements put together will make the order process prepared for the expected expansion that Noblessa is facing.

References

Literature

ALVESSON, M. & SKÖLDBERG, K. (1994) *Tolkning och reflektion – vetenskapsfilosofi och kvalitativ metod*, Studentlitteratur, Lund.

BELL, J. (2000) *Introduktion till Forskningsmetodik*, 3rd edition, Studentlitteratur, Lund.

BERGMAN, B. & KLEFSJÖ, B. (2001) *Kvalitet från behov till användning*, 3rd edition, Studentlitteratur, Lund.

CHRISTOPHER, M. (1998) *Logistics and Supply Chain Management*, 2nd edition, Prentice Hall, Harlow.

DAVENPORT, T.H. (1993) *Process Innovation – Reengineering Work through Information Technology*, Harvard Business School Press, Boston.

DEMING, W.E. (2000) *The new economics: for industry, government, education*, 2nd edition, MIT Press, Cambridge.

DICANDER ALEXANDERSSON, M., ALMHEM, L., RÖNNBERG, K. & VÄGGÖ, B. (1998) *Att lyckas med processledning*, 2nd edition, Liber Ekonomi, Malmö.

FREDHOLM, P. (2002) *Elektroniska affärer*, 5th edition, Studentlitteratur, Lund.

FØLLESDAL, D., WALLØE, L. & ELSTER, J. (2001) *Argumentationsteori, språk och vetenskapsfilosofi*, 3rd edition, Thales, Stockholm.

GOETZ, J.P. & LECOMPTE, M.D. (1984) *Ethnography and Qualitative Design in Educational Research*, Academic Press, Orlando.

HARRINGTON, H.J. (1991) *Business Process Improvement*, McGraw-Hill, Inc., New York.

JACOBS, F.R. & WHYBARK, D.C. (2000) *Why ERP? A Primer on SAP Implementation*, McGraw-Hill, Inc., New York.

LANGENWALTER, G.A. (2000) *Enterprise Resources Planning and Beyond – Integrating Your Entire Organization*, St. Lucie Press, Boca Raton.

LUNDAHL, U. & SKÄRVAD, P-H. (1999) *Utredningsmetodik för samhällsvetare och ekonomer*, 3rd edition, Studentlitteratur, Lund.

MAGNUSSON, J. & OLSSON, B. (2005) *Affärssystem*, Studentlitteratur, Lund.

MATTSSON, S.-A. (2002) *Logistik i försörjningskedjor*, Studentlitteratur, Lund.

MERRIAM, S.B. (1994) *Fallstudien som forskningsmetod*, Studentlitteratur, Lund.

PATEL, R. & DAVIDSON, B. (2003) *Forskningsmetodikens grunder – att planera, genomföra och rapportera en undersökning*, 3rd edition, Studentlitteratur, Lund.

REMENYI, D., WILLIAMS, B., MONEY, A. & SWARTZ, E. (1998) *Doing Research in Business and Management – An Introduction to Process and Method*, Sage Publications Ltd, London.

RENTZHOG, O. (1998) *Processorientering – En grund för morgondagens organisationer*, Studentlitteratur, Lund.

RUMMLER, G.A. & BRACHE, A.P. (1995) *Improving Performance*, 2nd edition, Jossey-Bass Publishers, San Fransisco.

SHARP, A. & MCDERMOTT, P. (2001) *Workflow Modeling – Tools for Process Improvement and Application Development*¸ Artech House, Inc., Norwood.

SMITH, A. (1976) *An inquiry into the nature and causes of the wealth of nations*, Clarendon Press, Oxford.

THURÉN, T. (1991) *Vetenskapsteori för nybörjare*, Liber AB, Malmö.

WILLOCH, B.-E. (1994) *Business Process Reengineering – En Praktisk Introduktion och Vägledning*, Docento Läromedel AB, Stockholm.

Articles

HAMMER, M. (1990) Reengineering Work: Don't Automate, Obliterate, *Harvard Business Review*, 68(4), 104-113.

KELLER, P.J. & JACKA, J.M. (1999) Process Mapping, *Internal Auditor*, 56(5), 60-65.

Interviews

SANDRA BERNER, Order Processor, Nobilia, 2005-12-19.

DIRK GROSSEKATTHOEFER, Transportation and production Planner, Nobilia, 2005-12-19.

ANDREAS JONSSON, Logistics Manager, Noblessa Sverige AB, continuous interviews.

KLARA MOLANDER, Order Executing Officer, Noblessa Sverige AB, 2006-01-10.

PONTUS MOLANDER, Managing Director, Noblessa Sverige AB, 2005-11-10.

PHILIPP NAUMANN, Salesman, Nobilia, 2005-12-19 & 2005-12-20.

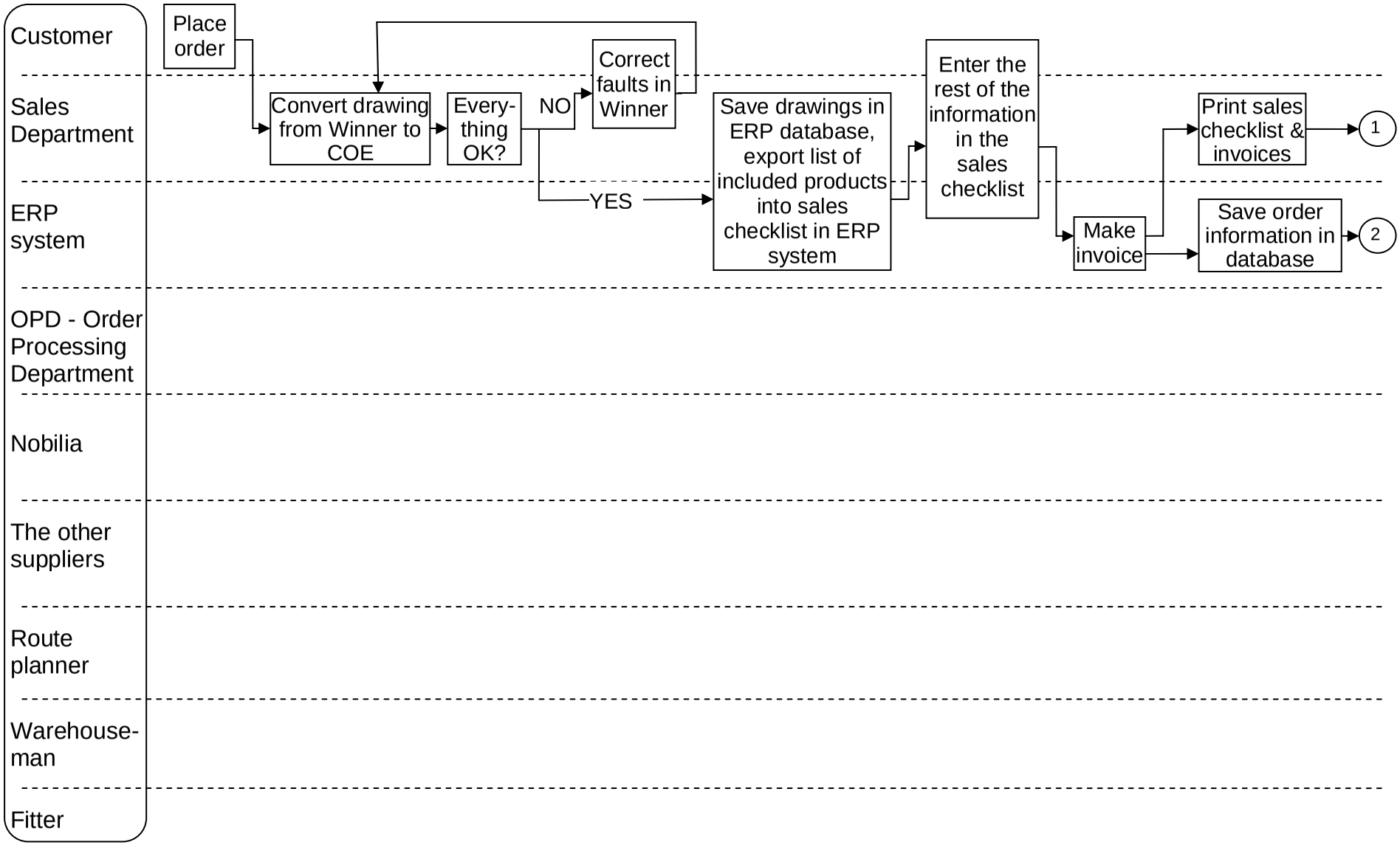
KERSTIN NORDQVIST, Salesman, Noblessa Sverige AB, 2006-01-10.

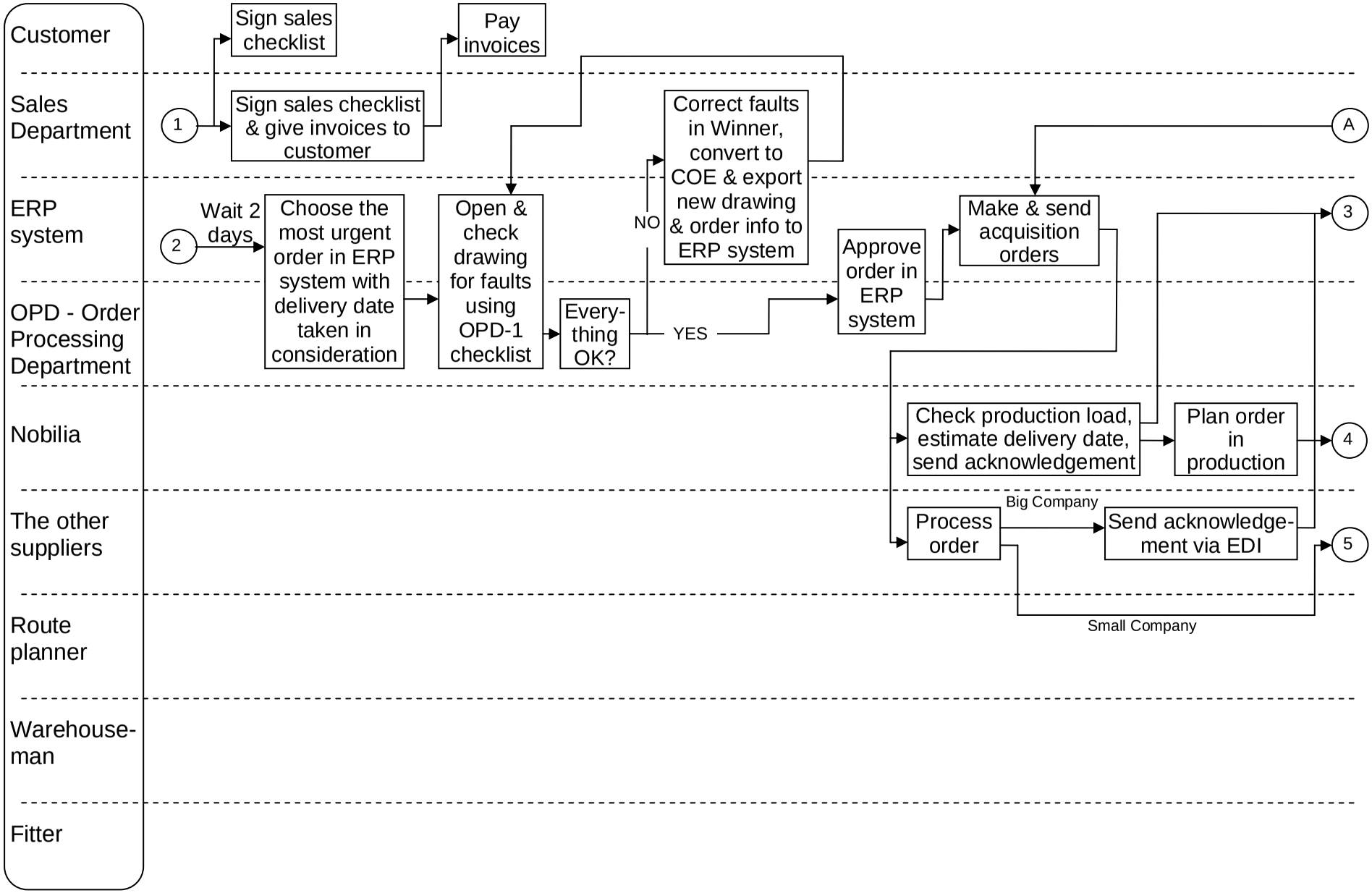
CAROLINE ROCÉN, Order Executing Officer, Noblessa Sverige AB, 2006-01-11.

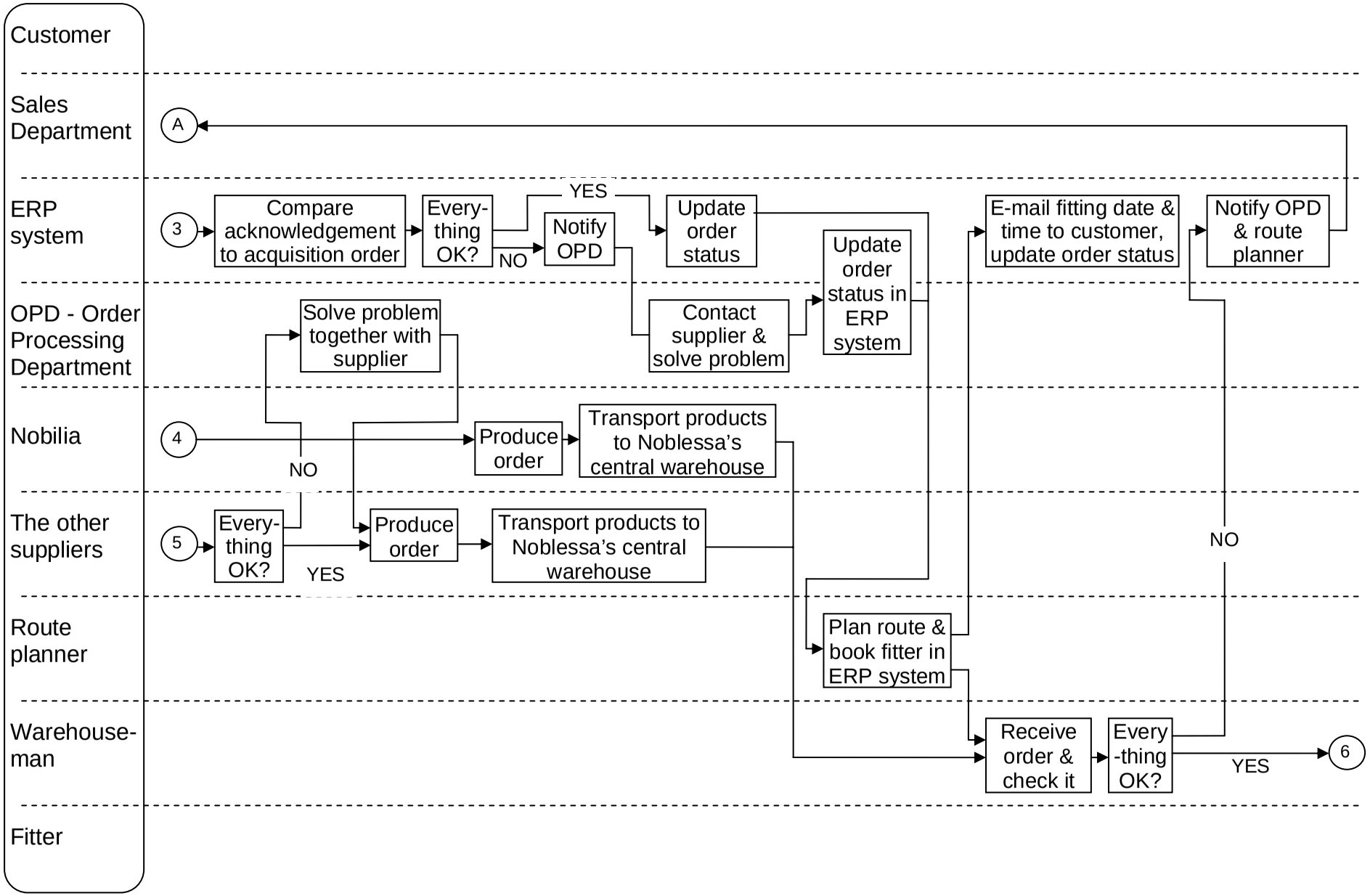
MANFRED UHR, COE responsible, Nobilia, 2005-12-19.

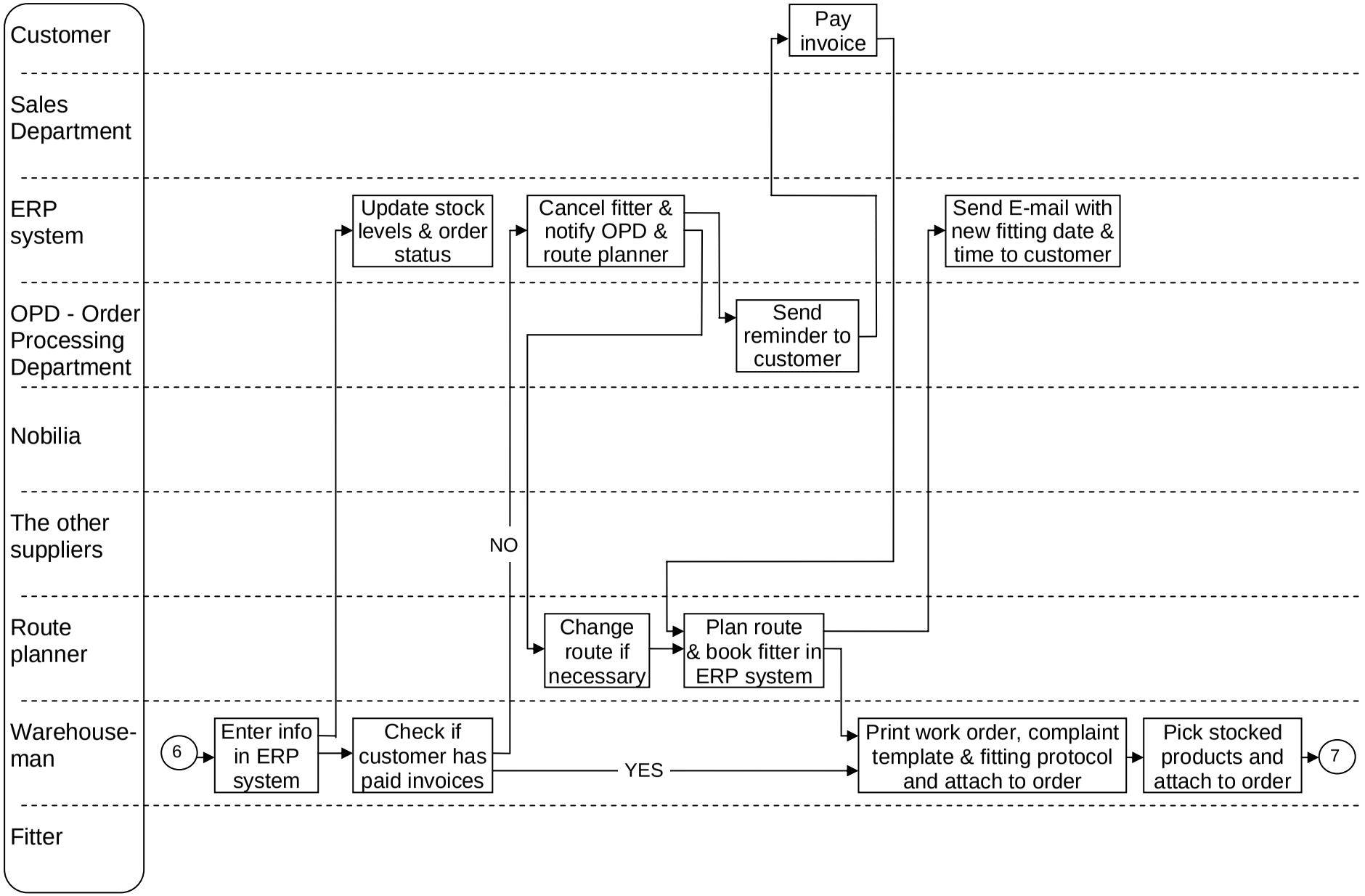
CECILIA ÖHLIN, Order Executing Officer, Noblessa Sverige AB, 2006-01-10.

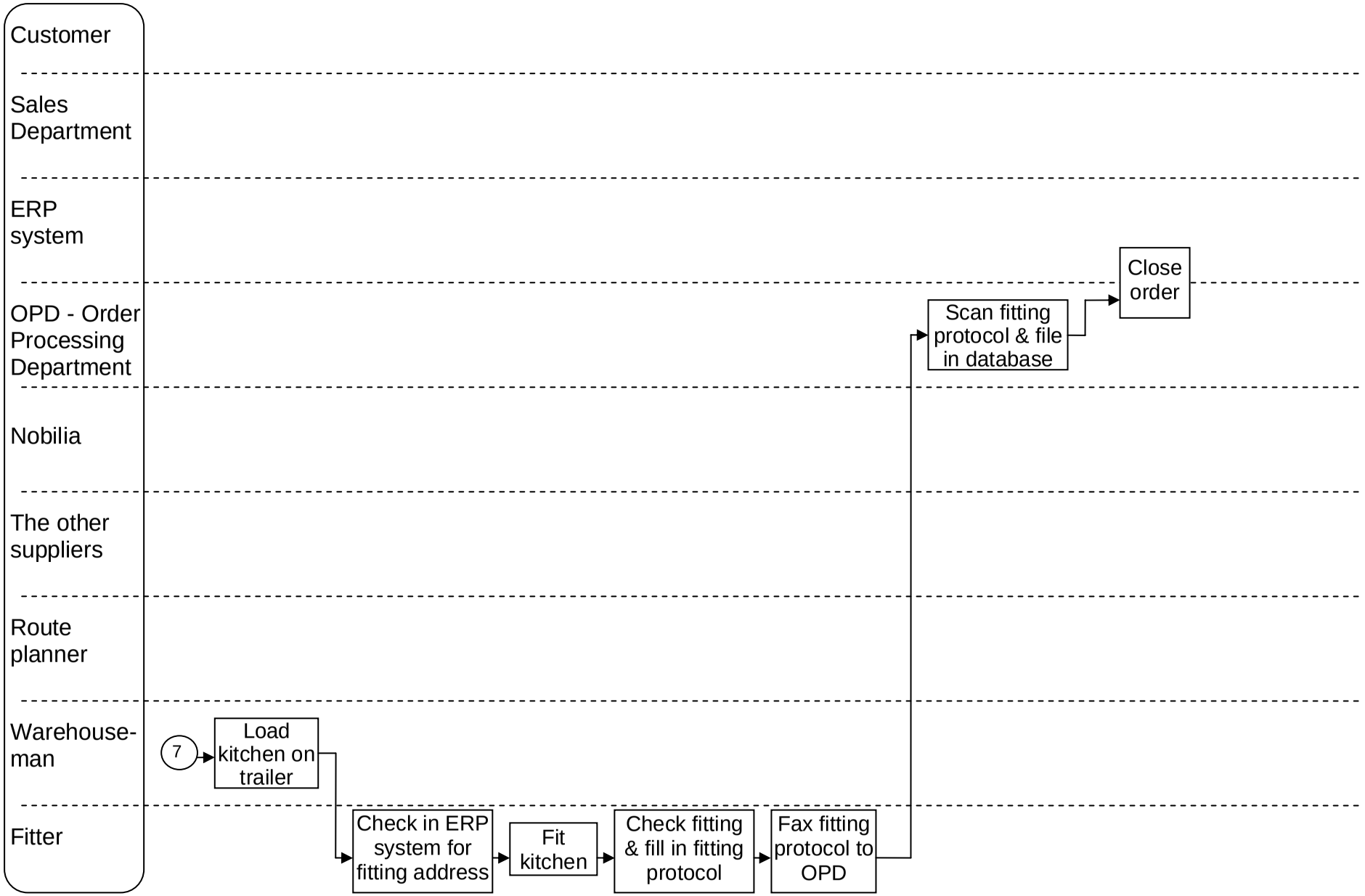
Appendix 1: Process model for the new order process




Customer
Sales Department
ERP system
OPD - Order Processing Department
Nobilia
The other suppliers
Route planner
Warehouse-man
Fitter
Sign sales checklist
Pay invoices
1
Sign sales checklist & give invoices to customer
A
Correct faults in Winner, convert to COE & export new drawing & order info to ERP system
NO
Wait 2 days
2
Choose the most urgent order in ERP system with delivery date taken in consideration
Open & check drawing for faults using OPD-1 checklist
Every-thing OK?
YES
Approve order in ERP system
Make & send acquisition orders
3
Check production load, estimate delivery date, send acknowledgement
Plan order in production
4
Big Company
Process order
Send acknowledge-ment via EDI
5
Small Company


Customer
Sales Department
ERP system
OPD - Order Processing Department
Nobilia
The other suppliers
Route planner
Warehouse-man
Fitter
A
3
Compare acknowledgement to acquisition order
Every-thing OK?
YES
NO
Notify OPD
Update order status
Update order status in ERP system
Contact supplier & solve problem
Solve problem together with supplier
E-mail fitting date & time to customer, update order status
Notify OPD & route planner
4
Produce order
Transport products to Noblessa's central warehouse
NO
5
Every-thing OK?
YES
Produce order
Transport products to Noblessa's central warehouse
NO
Plan route & book fitter in ERP system
Receive order & check it
Every -thing OK?
YES
6


Customer
Sales Department
ERP system
OPD - Order Processing Department
Nobilia
The other suppliers
Route planner
Warehouse-man
Fitter
Pay invoice
Update stock levels & order status
Cancel fitter & notify OPD & route planner
Send E-mail with new fitting date & time to customer
Send reminder to customer
NO
Change route if necessary
Plan route & book fitter in ERP system
6
Enter info in ERP system
Check if customer has paid invoices
YES
Print work order, complaint template & fitting protocol and attach to order
Pick stocked products and attach to order
7


Customer
Sales Department
ERP system
OPD - Order Processing Department
Nobilia
The other suppliers
Route planner
Warehouse-man
Fitter
7
Load kitchen on trailer
Check in ERP system for fitting address
Fit kitchen
Check fitting & fill in fitting protocol
Fax fitting protocol to OPD
Scan fitting protocol & file in database
Close order