

Masterproef

How useful is BPM when implementing a SAP system

Promotor :
Prof. dr. Koenraad VANHOOF

Niels Kums

*Master Thesis nominated to obtain the degree of Master of Management , specialization
Management Information Systems*

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FACULTY OF BUSINESS ECONOMICS

Master of Management: Management Information Systems

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Preface

This thesis, which is the capstone of my studies, was achieved with the help of some people. This foreword is an opportunity to thank all those people that have assisted me in writing this thesis.

The first person I like to thank is my promoter Prof. Dr. Koen Vanhoof. He was always available to answer questions and to solve occurred problems. His knowledge, expertise and interest were very helpful and were a kind of inspiration for me.

Then I want to say a word of thank to the employees of the company Pikon and Prof. Marc Geenen. They gave me the opportunity to follow a theoretical and practical course to learn to work with an ERP system. This was very useful and gave me a better understanding of an ERP system.

As last, I want to thank my girlfriend and family for their moral support during this project.

Summary

An enterprise resource planning (ERP) system has as purpose to facilitate the flow of information between all business functions inside the organization. Over the last years companies are depending more and more on ERP systems to compete with others and stay in business.

An ERP system gives a lot of opportunities to an organization, it can increase productivity, give the company the ability to react faster on changes in the market, it provides order tracking, But an ERP system is a very expensive system and the cost for implementing this system can be four times larger than the software itself. So the implementation of an ERP system is a costly activity for the company. If the organization fails to implement the system in a way that they get maximized profit from the advantages of the ERP system, it can lose a lot of money. Therefore the implementation phase of the ERP system is the most important phase.

Business process modeling (BPM) is an important part of the business process management. The purpose of modeling is to illustrate the business processes, enabling managers and employees to improve the flow and to streamline the process. The end result of the modeling gives an overview of the current business processes and what needs to be adjusted when the company implements an ERP system.

BPM models will be used by the implementation team when they need to implement the system. Now the question is, how useful is this business process modeling step. If BPM models are useless then eliminating the BPM steps can optimize the whole implementation phase, which would lead to faster and better implementation of the SAP system.

The first step is to take a look at the pitfalls during the implementation of an ERP system. A list of critical success factors is created to avoid these pitfalls. The thesis continues with describing the benefits of BPM and the implementation steps of an ERP system. These benefits and implementation steps will then be linked with the pitfalls described earlier.

This link revealed that BPM offers a lot of benefits for the company before and during the implementation. The system supports the selection of an ERP package and thus it helps making a better decision. Also the communication is improved when the company uses BPM. Besides these advantages, BPM also has some disadvantages (complex, time consuming and error prone), but these disadvantages can be restricted if there is a concrete methodology.

Chapter 4 gives an overview of the methodology for using BPM when implementing a SAP system. The chapter used a framework for implementing an ERP system, to take a closer look at the different steps that have to be taken when implementing an ERP system. BPM plays an important role in this framework. BPM starts with showing the current business processes in an AS-IS model, which makes it easier to understand the current situation. This AS-IS model is together with the strategic information the key component to find the business needs of the organization. These needs are documented in a TO-BE model. These two models lead to a better selection of the ERP package and this selection is a critical success factor of the ERP implementation.

The last step in the thesis described the three most common business process modeling languages (BPML) that are used for the implementation of the SAP system, namely business process modeling notation (BPMN), unified modeling language (UML) and business process execution language (BPEL). These BPML work together to facilitate BPM. BPMN is used to represent the business process at a high level that can easily be understood by business analysts and technical analysts. UML is mostly used for software modeling and it can be used for BPM at a more detailed level. BPEL is an execution language that is used at a later phase namely the implementation phase. But these BPML also have some shortcomings. There are no specific guidelines for transforming a BPMN model to an BPEL structure, BPMN and BPEL aren't covering all the workflow patterns (the milestone phenomenon), UML has insufficient differentiation between data - and control flow, and so on. So the described BPML are necessary for the design and implementation phase of the BPM, but there are still some points that need improvement.

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Chapter 1: The introduction

These days if companies want to survive, they need to be competitive. The organizations can improve their competitiveness by making their processes more efficient. The efficiency of the processes can be improved by eliminating bottlenecks, automating processes and better discovering, managing and sharing of the knowledge inside and outside the company. An Enterprise Resource Planning (ERP) system can be a solution to improve the efficiency of the organization. (Klaus H., Rosemann M. and Gable G., 2000)

An ERP system provides the company the ability to integrate the information flowing through the different departments of the company. ERP systems bring the technological infrastructure and management practices of the organization together and therefore it makes the processes more efficient. For managers this is a dream coming true and thus have enterprise resource planning systems become one of the most important technological developments in the modern industry. (Davenport T., 1998)

1.1 The problem statement

An enterprise resource planning (ERP) system has as purpose to facilitate the flow of information between all business functions inside the organization. Over the last years companies are depending more and more on the ERP system to compete with others and stay in business. Therefore companies who haven't got this system yet, try to implement it into their systems. (Klaus H., Rosemann M. and Gable G., 2000)

An ERP system can give a lot of advantages to an organization, it can increase productivity, it gives the company the ability to react faster on changes in the market, it provides order tracking, But implementing the system is very time consuming and very costly for a company. This means there will be a huge loss, if the organization fails to implement the system correctly and in a way that they can

get maximized profit from the advantages of the ERP system. Therefore the implementation phase of the ERP system is the most important phase. (Griffith T., Zammuto R. and Aiman-Smith L., 1999)

Before the implementation of the ERP system starts, the organization needs to restructure the business processes of the company so that the system fits in well and that it can work optimal. When an organisation wants to implement an enterprise resource planning system, it uses business process management. This thesis is interested in the modeling phase of the business process management, also called business process modeling (BPM). (Francalanci C., 2001)

Business process modeling is an important part of the business process management. The purpose of modeling is to illustrate the business processes, enabling managers and employees to improve the flow and to streamline the process. The end result of the modeling is from essentially value for the customer, because it gives an overview of the current business processes and what needs to be adjusted when the company implements an ERP system. (Štemberger M. and Kovačič A., 2008)

After they modelled the system, The IT-crew has to implement the system, but it's not known how and even if they use the BPM for implementing the ERP system. Previous parts already mentioned that the implementation of a SAP system (ERP system of the company SAP) is very expensive and for many companies it's a huge investment which not necessarily leads to success. The companies try to limit that risk by putting a lot of time and money in the modeling of the SAP system. This thesis tries to figure out how useful business process modeling is when the organization is implementing an ERP system. If BPM is useless then eliminating the BPM steps can optimize the whole implementation phase. Which would lead to faster and better implementation of the SAP system, giving more chance for success and saving valuable time.

1.2 The research question and the sub questions

The problem statement showed that BPM can be used to support the design phase of an ERP system. Our objective is to study if business process modeling is necessary when the company wants to implement a SAP system and how the BPM can be used during this implementation. So the research

question of this master thesis is, how useful is BPM when implementing a SAP system. To find an answer for this question, several sub questions need to be solved. These sub questions are:

1. What can go wrong when implementing a SAP system ?

This section describes the frequently recurring errors when the company implements a SAP system. There will be information about what went wrong and how we could have avoided these mistakes.

2. What services does BPM offer when implementing a SAP system?

This contains a summary of the services business process modeling offer. A look is taken at the implementation phases of an ERP system. The pitfalls from sub question 1 will be linked with the services of BPM and the implementation phases of an ERP system. This linked information will lead to the discovery and description of the services that BPM offers when the organization wants to implement an ERP system

3. What's the methodology for using BPM when implementing a SAP system ?

We could save a lot of money and time if there was a standard pattern or guideline for BPM when implementing a SAP system. If there is a guideline or pattern than we just need to follow the steps when we are implementing the SAP system. This step searches a framework that can be used when the company implements an ERP system..

4. What Languages are used for BPM?

There are many different languages that can be used for BPM, this section of the master thesis is going to describe the most common languages, the advantages and disadvantages of these business process modeling languages. This part of the master thesis tries to figure out, in what way the IT-crew uses BPM when they implement the SAP system and if they need to put a lot of effort in it before they can use it properly. Did they prepare the outcome of the business process modeling phase in a way that is easy to use/understand for the crew that has to implement the SAP system.

1.3 The approach

Because this study is a theoretical study, the main method of research is reading articles and gathering information. For the first research question, a literature study is done about the possible pitfalls when the organization is implementing an ERP system.

For sub question 2, an overview of the services of BPM is needed. Again a literature study about BPM and the implementation steps of an ERP system are needed. Also the results of the previous sub question is required to link these pitfalls with the services of BPM and the implementation phases of an ERP system.

Sub question 3 requires not only a literature study, but also a tutorial of SAP Netweaver. This tutorial was necessary to receive a better understanding and opinion about BPM. Afterwards a framework is used to explain the methodology of BPM.

The last sub question describes the different business process modeling languages. Scientific articles about BPMN, UML and BPEL will give a better understanding of these languages. The tutorial of SAP Netweaver is going to give some practical experience with BPMN.

1.4 The outline

This section of the thesis gives an overview of the different chapters and what will be in these chapters. The outline starts with chapter 2. Chapter 2 describes the first sub question, namely what can go wrong when implementing an ERP system. This chapter gives an overview of the pitfalls of the implementation of an ERP system, afterwards it describes how these problems can be avoided.

Chapter 3 contains the services that business process modeling offers when an organization wants to implement an ERP system. The chapter starts with the benefits of BPM and it tries to link these benefits with the pitfalls of an ERP system. That way a list can be made of the most important services of BPM when implementing an ERP system.

The next chapter is chapter 4. This chapter searches a framework, pattern or guidelines that can be used when the organization wants to implement the ERP system. A tutorial of SAP Netweaver is followed to get a better understanding of BPM. After finishing the tutorial a framework of BPM is explained.

Chapter 5 contains an overview of the most common business process modeling languages. The chapter starts with explaining BPMN. Afterwards UML and BPEL are described and compared with BPMN. Also the most important advantages and disadvantages of all these languages are discussed in this chapter.

The last chapter is the conclusion. This chapter will give an overview of the most important information of the previous chapters and draw conclusions from this information. Recommendations are made at the end.

Chapter 2: What can go wrong when implementing a SAP system ?

Like mentioned in the introduction, a SAP system has a lot of benefits for a company, but this doesn't mean that a SAP system will always lead to success. According to Griffith, Zammuto, and Aiman-Smith (1999): "three-quarters of the enterprise resource planning systems installations were judged unsuccessful by the companies paying the bills". We also know that the implementation of a SAP system is very costly and time consuming. So it's crucial that everything goes smoothly when the company implements this system. This section will discuss frequently recurring errors when a company implements a SAP system. It will take a closer look at the recurring errors and tell about solutions that help to avoid these pitfalls. Because there are so much possible implementation errors, we are only going to describe the most common implementation problems.

2.1 The most common critical success factors

For the first step the Critical Success Factors (CSFs) developed by Somers and Nelson (2001) is utilized to find the most common mistakes a organization can make. Table 2.1 shows the top 10 of Somers and Nelson's results, providing the mean rankings of CSFs by degree of importance in ERP implementation.

Critical success Factors	Mean
Top management support	4.29
Project team competence	4.20
Interdepartmental cooperation	4.19
Clear goals and objectives	4.15
Project management	4.13
Interdepartmental Communication	4.09
Management of expectations	4.04
Project champion	4.03
Vendor support	4.03
Careful package selection	3.89

Table 2.2: The mean rankings of Critical Success Factors by degree of importance in ERP implementation

2.1.1 Top management support

Table 2.1 reveals these critical success factors and it shows that top management support is at the top of the critical success factors list. So the table tells that lack of top management support is one of the most common errors. There are a lot of reasons why top management support is important. According to Kraemmergaard and Moller (2000), "top management involvement is critical, while only top managers are equipped to act as the mediator between the imperative of the technology and the imperative of the organization". Welti (1999) mentions that "active participation by upper management is crucial to the adequate resourcing of the project, to taking fast decisions, and to promoting company-wide acceptance of the project". It's very important that the employees accept the new system. If they refuse the system, then they will counteract. This leads to inefficiencies and as we already told in the introduction, one of the most important reasons to implement a SAP system is to make the processes more efficient. Another reason is that when the top management decides to stop investing in ERP systems during the implementations, than the system will fail and the money and time, that already is invested in the system, is lost. The propositions of Kraemmergaard and Moller (2000) and Welti (1999), shows that top management is crucial for a

successful implementation of a SAP system. So the change that the SAP system fails becomes bigger when the organization lacks top management support.

2.1.2 The implementation team

The next implementation problem is that the organization chooses an inappropriate implementation team. This can lead to a lot of problems during the implementation of the SAP system and probably to a failure.

The first mistake the organization can make is to keep their most valuable personal working on the processes of the company and to select some new and less experienced personal to implement the system. That way the organization will underestimate the strategic importance of the implementation process. These less experienced employees have a good vision about their own job, but they have a lack of understanding company's strategic goals and/ or the operations in the company. They will be more interested in making their jobs easier at expense of others in the organization.

A common error is that they will only assign senior managers. These manager know exactly what the goals of the companies are and where they want to go to. The problem with this implementation team is that they don't know all the processes into detail that are used in the company. This is necessary when we implement a SAP system that needs to make these processes more efficient.

The correct choice would be to choose for the middle managers who have knowledge about the company's strategic goals as well as about the detailed processes in the company.

The organization also need to make sure that the implementation team as enough time to work on the project. Therefore assigning a part-time project manager is discommended to an organization. The manager has to do two jobs now and most of the times neither job is done well. The project manager needs to be an active leader pushing for accountability, transparency, and decisiveness. (Somers T. and Nelson K., 2001)(Barki H., Rivard S. and Talbot J.,1993)

2.1.3 Interdepartmental cooperation

At the third place of the critical success factor list is the interdepartmental cooperation. Interdepartmental cooperation is that the organization has a corporate goal to make the departments clear of the necessity to share common goals in several separate departments. They also need to underscore the value of trust between employees, managers and corporations. (Stefanou C., 1999). The different departments need to cooperate together as one. An ERP system tries to make the processes more efficient and the organization can't use the full potential of an ERP if the different departments don't have common goals. To get the maximum potential out of a SAP system, a strong coordination of effort and goals is needed across business and IT personnel. (Willcocks L. and Sykes R.,2000)

2.1.4 The goals and objectives of the implementation

Another mistake an organization can make during the implementation is that they don't have clear goals and objectives. One reason why many performance management systems fail badly is that they rely on poorly defined, or even non-existent goals and objectives for employees. Clear goals and objectives for employees serve two major purposes:

First, they help the employee understand what is expected of him or her. They help tell employees what parts of their jobs are most important and less important. Having clear goals helps employees self-correct and make their own decisions on a day-to-day basis, which means less work for managers. So, in short, they guide employee behavior.

Second, clear goals and objectives makes it easier for managers to evaluate the employees performance. It's very hard to properly evaluate the employee if there are no goals and objectives. The employee and the manager will both have their own vision of what needs to be done and this can give conflicts. So clear goals and objectives help reduce subjectivity by supplying some criteria for employee success. When these criteria are clear and manager and employee understand them in the same way, they tend to reduce arguments in the performance appraisal process. (Krupp J., 1998) (Latamore G.,1999)(Travis D.,1999)

2.1.5 Project management

The next step at table 2.1 of Somers & Nelson (2001) is the project management and it stands at place five. According to Munns K. and Bjeirmi B.(1999) project management can be defined as “ the process of controlling the achievement of the project objectives. Utilizing the existing organizational structures and resources, it seeks to manage the project by applying a collection of tools and techniques, without adversely disturbing the routine operation of the company.” This definition reveals a close link between project management and some of the other critical success factors. For example, the organization needs to assign an appropriate team to control that everything goes as planned, this example shows that there is a link between project team competence and project management. The same can be told about project management and top management support and the necessity of having clear goals and objectives. Without this support the project management can never follow the project properly. If the team can’t follow the project, then they can’t control and if necessary redirect the project.

2.1.6 Interdepartmental communication

The next critical success factor on the list is interdepartmental Communication. Slevin and Pinto (1986) identified “communication as a key component across all ten factors of their Project implementation profile and maintained that communication is essential within the project team, between the team and the rest of the organization, and with the client”. Like is shown in the statement of Slevin and Pinto, communication plays an important part in the organization. Communication makes it easier to implement a SAP system. It makes it easier to find problems in plans, to eliminate these errors and to inform the people. Communication can change resistant employees to cooperating workers in a company. If the employees are involved and if they are aware that the SAP system is essential for the company, then they will cooperate more easily. This can be the crucial difference between going to success or failure.

2.1.7 Management of expectations

Critical success factor seven in the list is the management of expectations. This point leans close to the critical success factor of making clear goals and objectives. Normally when a organization considers to implement an ERP system, they want to achieve a goal or objective with this system, so they hope to fulfill their expectations. Ginzberg M. (1981) discovered a correlation between the management of expectations and the outcome of a project. He showed us that “The results of a number of implementation studies suggest that implementation failure is more likely when users hold unrealistic expectations about a system. Research in other areas, especially product evaluation and job satisfaction, also shows a connection between realism of expectations and outcomes”. Even when the SAP system is getting a positive contribution for the company, it will be considered as failed when they have unrealistic expectations. So the management of the expectations is crucial when an organization is implementing an ERP system.

2.1.8 The project champion

The next critical success factor that is going to be discussed is choosing the right person to be project champion. According to Howell M. and Shea C. (2001): “From the perspective of division managers, champions make a positive contribution to project performance over time, reinforcing the crucial role that champions play in the new product development process”. A good attitude for a project champion is that he/she shows that they believe in the new technology, the champion has to be involved and try to motivate other employees. If the company appoints a person with this attitude, the chance of success when they implement an ERP system will increase. The article of Somers T. and Nelson K. (2001) shows that a project champion needs to understand the technology of the project that the company is going to implement as well as the organizational goals of the company. So the company can best choose for an executive level individual who also has knowledge of the operational processes of the company.

2.1.9 Vendor support

Vendor support is the next critical success factor on the list. Like mentioned before ERP systems are a huge investment for a company and therefore they are expected to be a long term project. During

this long term there will always be adjustments and/or improvements of the ERP system to improve its efficiency for the company's operations. Vendor support can play a crucial role for the implementation of these improvement or updates. The company needs to make sure that they chooses a vendor who gives a good service. This means that he will give support whenever the organizations needs it. This can be support with complex software installations, maintenance emergencies and if necessary user training. (Davenport T., 1998)

2.1.10 Package selection

The last of the critical success factors that is going to be discussed is the careful package selection. To choose the correct package the implementation team needs to make some important decisions regarding time, budgets and goals of the organization,... . The first step a company needs to do is to find out why they need the system, what do we want to achieve? They have to choose a package that supports the organizations processes with as minimal modifications as possible and that's easy to implement in the organization. (Janson M. and Subramanian A., 1996)(Stefanou C., 2000).

2.1.11 Budget and contract details

Some companies don't properly think about the budget and contract details when they decide to implement an ERP system. This is a disastrous mistake and will probably lead to bankruptcy of the organization. They know that the cost of the implementation is much more expensive than the software itself. So it's very important to take a close look to the budget and contract details. When the company signs a contract they have a lot of different possibilities. Depending on the agreements reached there are a number of different problems that might arise, leading to increased costs or decreased quality of systems.

One of the worst mistakes that can be made is to agree to a 'time + materials' project. This means that ERP system provider gets paid for each day he works and for all the materials that are needed during the implementation. When the company has this kind of agreement the vendor will always say: " yes, it's a good idea to adjust this to the standard SAP package", but the organization doesn't

know if it's really an improvement for the efficiency of the process. The vendor only wants to earn more money.

The opposite of this type of agreement would be a fixed price project. But it leads to not getting what the company wants. They need to define what they want down to the last detail, describing all of the requirements you might have at a stage when the organization doesn't really know all of its requirements.

A possible solution might be a 'shared risk' contract. This means that the company and the vendor agree on a fixed price but say that if the project overruns in certain circumstances that these will be charged at a reduced rate. So there are some things they can do, but the main thing is that neither one extreme or the other will make the company happy. (de Koning F., 2004) (Janson M. and Subramanian A., 1996)

2.1.12 Conclusion of critical success factors

We can conclude that the organization needs to be very careful when they select an ERP package. An ERP system is a long term investment and a badly chosen package can give huge extra cost. In the appendix a software package selection questionnaire according to Janson M., and Subramanian A. (1996) is shown. This questionnaire is very useful when the organization wants the right ERP package which supports their operational processes.

2.2 Other important critical success factors

Previous section discussed the top ten critical success factors according to table of Somers T. and Nelson K. (2001)(table2.1). Holland C. and Light B. (1999) mention a few other critical success factors. The first CSF they discuss is legacy systems. They stated that : "Legacy systems encapsulate the existing business processes, organization structure, culture and information technology. Therefore they cannot be controlled by the company in the same way as the other variables in the model". This means that the organization needs to evaluate the legacy systems, before it can make a good choice

about what SAP software package they should take. Does the company want the standard package or a customized ERP system and how much do they need to change in the organization?

The second and last additional critical success factor that Holland C. and Light B. (1999) mention is ERP strategy. This factor determines if the organization is going to implement it as 'big bang' or step by step with the traditional system.

The article of Brown C. and Vessey I. (1999) mentions that 'big bang' implementation means implementing the whole SAP system in one time. This holds huge risks because when an organization implement it all at ones, than it's getting more complicated and it has a bigger chance to make mistakes. Mistakes in the implementation phases can lead to a failure of the SAP system.

Another method in the article of Brown C. and Vessey I. (1999) is the step by step implementation. This method starts with building the skeleton of the SAP system first and then enrolling the other necessary modules one by one till the implementation is finished. This method makes the implementation less complex and therefore decreases the chance of making a mistake.

2.3 Conclusion

As you can see above, there are many pitfalls when an organization is implementing an ERP system. This section only described the most common pitfalls, so there are still many other but less common mistakes that companies can make. The company has to make sure that they implement the system properly.

The next chapter in this thesis will show what services that business process modeling can offer when an organization is implementing a SAP system in a company.

Chapter 3: What services does BPM offer when implementing a SAP system ?

This chapter discusses the services that are offered by business process modeling when an organization wants to implement an ERP system. The first part shows a short overview about what business process modeling really is and how it can be used. The next part describes the benefits of business process modeling and why companies might prefer business process modeling. Then the chapter gives a short overview of the steps for implementing an ERP system. The next step is to link part two and three of this chapter with the pitfalls of the implementation of an ERP system. This will lead to an overview of the service that BPM offers when an organization implements an ERP system. These services will also be discussed briefly in that part of the chapter. The last part of this sub question gives a description of some of the most important disadvantages of business process modeling.

3.1 What is business process modeling ?

Davenport & Short (1990) define *business process* as—"a set of logically related tasks performed to achieve a defined business outcome". So business processes are defined as a number of actions designed to produce a product or service. Rummler & Brache (1995) divide business processes into two different groups of processes, namely the primary or core processes and the secondary or support processes. The primary processes are the processes that produce the product or service for the external customer. Secondary or support processes produce products that support the core processes and therefore they are crucial for the internal customer of the organizations.

Štolfa and Vondrák (2006) took a closer look at business process and stated that: "Business process gives us an opportunity to manage project effectively by organization, simulation and realization of accurate planned processes". Under this section an example is shown of a business process. The

example shows the use of the business process for a video lending library. The article of Indulska, Green, Recker and Rosemann(2009) explains that a business process model is used to describe the events, the flow and the activities that represent a business process. These two articles indicate that the business process model is an important tool for analyzing, designing and re-engineering.

The paragraphs above give an overview of the meaning of business processes and process models, a simple definition can be given for business process modeling. It can be described as the activity of representing these business processes of an organization. This can be used to analyze and sometimes improve processes in an organization.

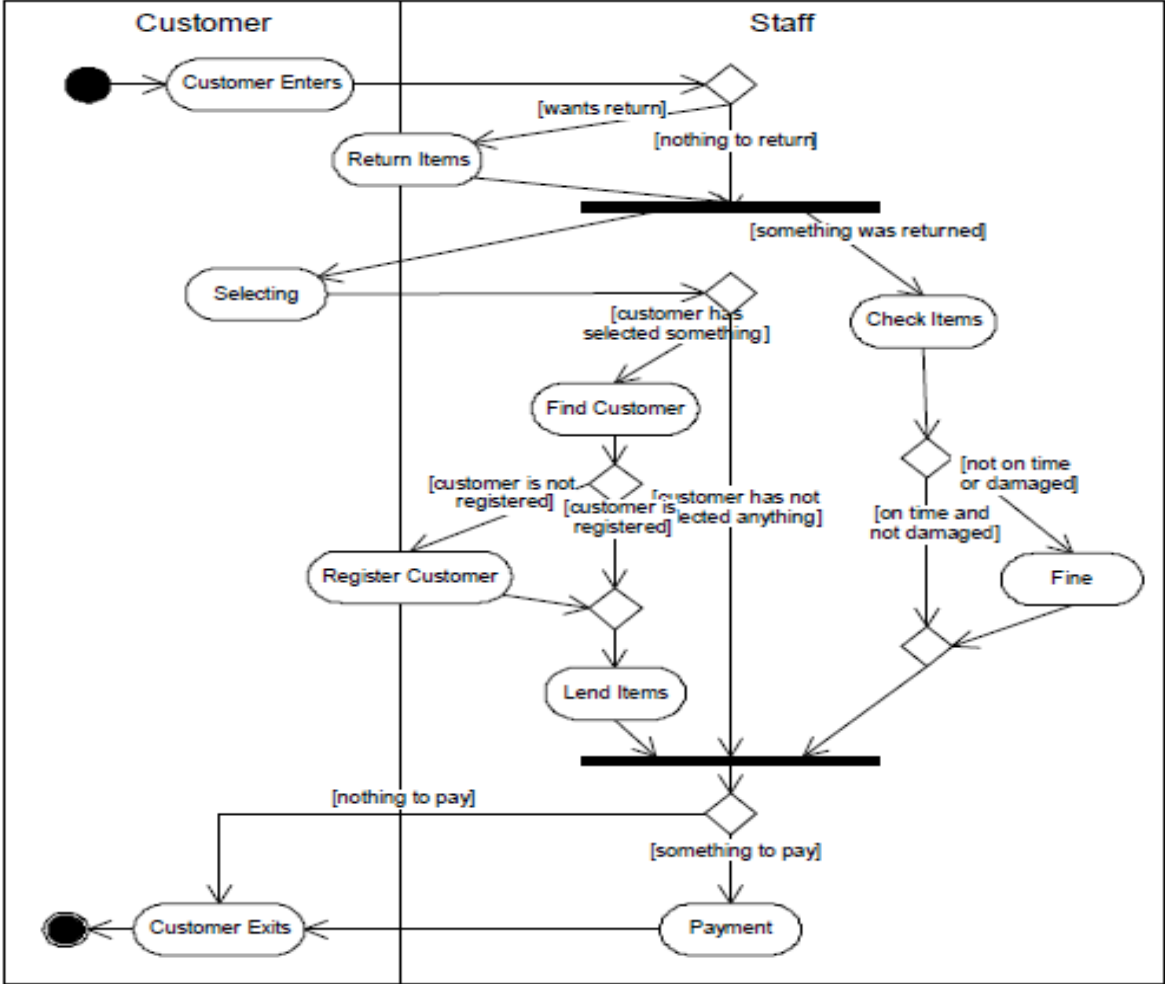


Figure 3.1: Business process for a video lending library

3.2 Benefits of business process modeling

The previous section discussed what business process modeling really does for an organization and it described business process modeling as the activity of representing business processes of an organization. The description of business process modeling shows that modeling can offer a lot of benefits. This section will give an overview and a description of the most important benefits of business process modeling. In this section I used the framework from the study of Indulska, Green, Recker and Rosemann (2009). This framework results in a list of the top ten business process modeling benefits. Table 3.1 shows this top ten.

Rank	Issue	Description
1	Process improvement	Greater ability to improve business processes
2	Understanding	Improved and consistent understanding of business processes
3	Communication	Improved communication of business processes across different stakeholder groups
4	Model-driven process execution	Ability to facilitate or support process automation, execution or enactment on the basis of the models
5	Process performance measurement	Issues related to the definition, identification or modeling of adequate levels of process abstraction.
6	Process analysis	Greater ability to model processes to analyze them for possible problems, and/or time/cost reductions
7	Knowledge management	Support for identification, capture and management of organizational knowledge
8	Re-use	Greater ability to re-use previously designed and validated processes
9	Process simulation	Greater ability to see how a current or re-designed process might operate, and its implications
10	Change management	Support for business change management practices, results or impacts

Table 3.1: The Overall top ten business process modeling

3.2.1 Process improvement

As mentioned above, table 3.1 reveals us the top ten of the business process modeling benefits according to Indulska, Green, Recker and Rosemann (2009). The most important benefit on the list is process improvement. In every organization there are some unresolved and unidentified inefficiencies or bottlenecks. These inefficiencies bring losses for an organizations, so improving these irregularities will lead to a competitive advantage (faster production, lower production cost,...) for the company (Lawrence S., Buss A., 1995). Business process modeling represents the business processes of an organization. So using Business process modeling makes it easier to understand the current processes and therefore it will be easier to spot inefficiencies and bottlenecks in these

existing processes. When these irregularities are found, it will be easier to improve this process. Therefore business process modeling can improve the processes of an organization and thus can lead to competitive advantage.

3.2.2 Understanding of the business processes

The second overall business process modeling benefit is understanding. Companies can have a lot of processes and therefore the organizational process can be quite complex (Childe, Maull and Bennett, 1994). Understanding the business processes makes it possible for the organization to change processes quickly when the company notices new business opportunities or spots business challenges. Before we can improve the processes, we need to understand them. According to the book of Havey (2005): "Adopting BPM forces a business to think through and formalize its understanding of current processes". This means that when a company uses BPM it will need to answer questions regarding the current processes on strategic, tactical and operational level (von Halle and Goldberg 2009). To do so the organization needs to understand the business process. So business process modeling gives a better understanding of the existing processes.

3.2.3 Communication

The next benefit on the list is communication. According to Somers and Nelson (2001) communication is one of the key components when we are implementing a project. Good communication distinguish successful businesses, it gives a good overview what they need to do and how they need to do it. Clear communication improves the efficiency of a team.

Business Process Modeling improves the communication of the organizations business. It offers a standard for representing business processes, namely the unified modeling language (UML) (Clark and Evans, 1997). Unified modeling language is a notation system that is easy to understand. This way the management, stakeholders and the operational department can better communicate with each other. It helps business managers communicate their ideas quickly and clearly. Another benefit of the UML is that employees in the operational department can understand the organizational processes and thus think with the management for making the process more efficient. More thinkers will lead to more ideas.

3.2.4 Model-driven process execution

The next point in the top ten business process modeling benefits is model-driven process execution. The description in table 3.1 tells us that Business process modeling gives us the ability to support and facilitate process automation, execution or reengineering. In other words it means that when the organization wants to improve, implement or remove processes, then they can follow models to support or facilitate these activities (Indulska, Green, Recker and Rosemann 2009). This implies that companies who use this kind of architecture can improve, implement and remove processes much faster and more accurate. According to the book of Mellor and Balcer (2002) executable UML (unified modeling language) is the foundation of the model-driven process execution. And like mentioned in the section of the benefit communication, business process modeling provides the organization the chance of using UML.

3.2.4 Process performance measurement and process analysis

Point five and six on the list are process performance measurement and process analysis. Process analysis is a method to evaluate and improve the performance of the business processes (Trischler, 1996). Process performance measurement reveals the organization important information about the processes that drive the company. It helps us to manage and understand the current processes, showing where organizations can be improved. The article of Seel and Thomas (2007) shows that performance measurement is done at two different levels, namely the strategic and operational level.

The strategic level begins with identifying the relevant processes, describing the process architecture and making a balanced scorecard deduced from the strategy of the organization. This balanced scorecard shows where improvement is necessary.

The operational level of process performance measurement shows a close link between process performance measurement and process analysis. This link is visible at the end of the section in figure 3.2 (Seel and Thomas, 2007). The first step of the process performance measurement on operational level is identifying and defining of performance indicators. Afterwards the organization needs to define the measurement elements, these elements enables the evaluation of the different processes and therefore figure 3.2 calls them the enablers . These measurement elements are dependent on

the strategic goals of an organization. When the organization has evaluated the different processes in a company, it can see the inefficiencies in the organization. That way they can find new ways to eliminate these inefficiencies and make their processes more efficient.

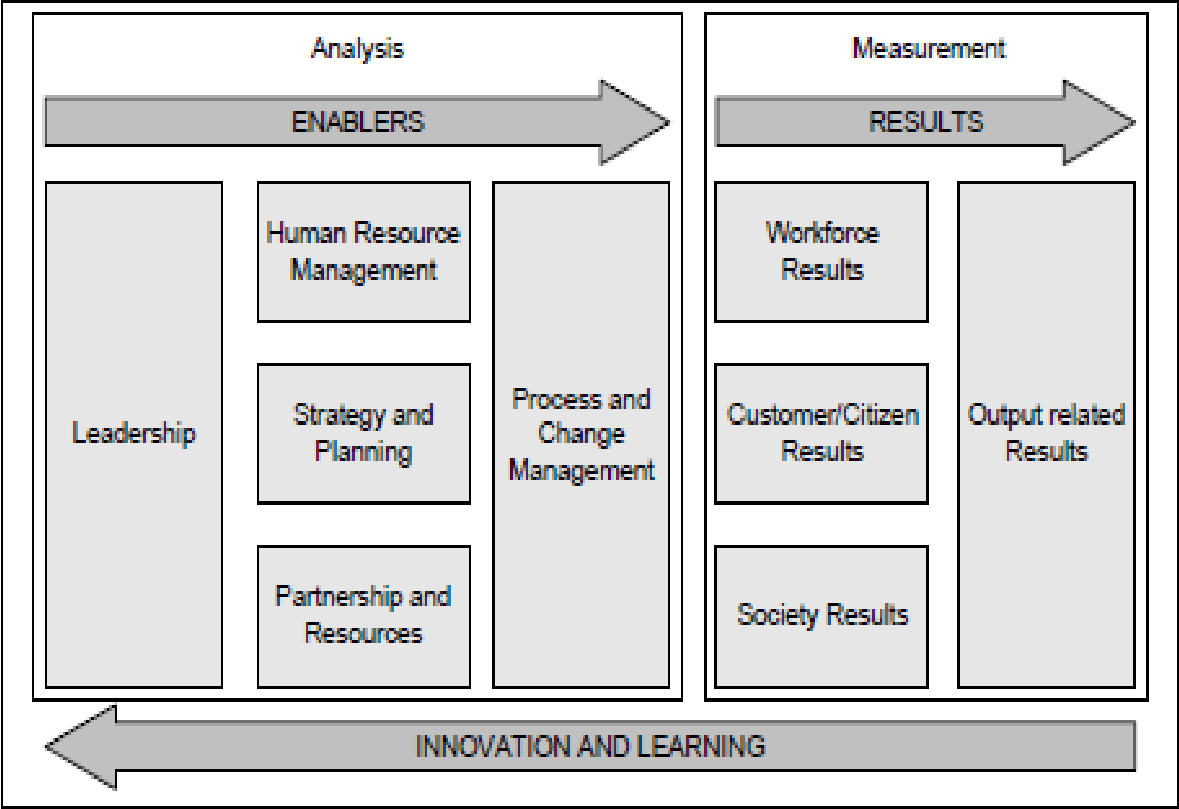


Figure 3.2: Common Assessment Framework

3.2.5 Knowledge management

The next point we are going to discuss is Knowledge management. Because of the cheap production cost in developing countries. The western countries have shifted from a production based industry to a knowledge based industry. Organizations need to understand what their knowledge asset are and how to get maximum benefits from these knowledge assets. Knowledge management is the activity used for creating, indentifying, storing, transforming and adopting knowledge in the organization (Gold, Malhotra and Segars 2001). The BPM benefit knowledge management leans close to the benefit communication. For companies with a good communication, it’s easier to document informal

knowledge and to pass knowledge between employees. The section of communication showed us that UML is a notation system that is easy to understand. This way the management, stakeholders and the operational department can better communicate with each other. This way employees can share their knowledge with colleagues and organizations get the chance of writing down this knowledge. It can lead to many benefits, like assuring that knowledge stays in the company when employees leave the company, it facilitates the training of new employees, possibility for faster knowledge transfer between employees,... . (Pryor 2010).

3.2.6 Reuse of validated processes

Reuse is the next business process modeling benefit on the list. According to Indulska, Green, Recker and Rosemann (2009): “ Business process modeling gives the organization a greater ability to re-use previously designed and validated processes”. This means that business process modeling facilitates re-using of processes. The article of Cerovsek and Katranuschkov (2006) shows us the benefits that can be gained when an organization reuses processes and knowledge. They mentioned that reusing processes, makes it possible for software implementation teams to make more efficient decisions.

3.2.7 Process simulation

The ninth benefit is process simulation. Every organization wants to be as competitive as possible, they can do this by searching and eliminating bottlenecks in their processes and so make these processes more efficient. The article of Tumay (1996) reveals that process simulation can be a critical tool to find and eliminate this inefficiencies. It gives the organization the opportunity to understand the process flows, this facilitates the company to find processes that need improvement. The process simulation step of business process modeling allows the organization to increase productivity and enable these companies to make their process more efficient.

3.2.8 Change management

The last place of the BPM benefits is for change management. When a organization implements a new software or improves processes, it needs to change some of its current processes. Changing these processes can lead to a change of the procedure an employee normally follows. These changes can cause resistance or confusion among the employees, leading to a decrease in productivity and

efficiency (Somers and Nelson, 2001). Business process modeling doesn't only help to reduce this resistance and confusion. It also helps to link the strategy of the organization to business processes. With business process modeling, the operational activities help the company implement its strategy. This gives a greater chance of success when we implement changes in our processes. So we can say that BPM is a critical instrument when we are implementing changes in the company.

3.2.9 Conclusion

All of these previous discussed benefits can give the organization a certain competitive advantage. So we can conclude that business process modeling can give a competitive advantage for an organization. Even the smallest improvements of the processes can lead to a huge competitive advantage. This small improvement can make the organization more efficient and so better than their competitors.

3.3 The implementation of a SAP system

Soffer, Golany and Dori (2003) stated that: "Enterprise Resource Planning (ERP) systems are off-the-shelf software packages that support most of the key functions of an enterprise". This quote shows how important an ERP system can be for the organization. But the quote also reveals that SAP systems are off-the-shelf software packages. Companies need to choose the software package that corresponds best with their own processes. Because every company is unique, most of the organizations processes don't have a corresponding standard SAP software package. So Companies need to adjust their processes or customize the standard software package. Therefore enterprises need to do more than just buy and install the ERP system.

There are several steps that need to be followed when we are implementing an ERP system. Below you can find the different implementation phases and the objective that need to be fulfilled when we implement a SAP system according to Francalanci C. (2001).

Implementation phase	Definition for ERPs	Definition for traditional software development
Phase 1: requirements analysis and specification	It analyses organizational processes and compares them with the procedures embedded in the ERP package in order to distinguish between modules that can be parameterized and modules that need reprogramming. Functional and data requirements are specified for modules that need reprogramming	It defines users' functional and data requirements in a non-technical language
Phase 2: conceptual design	It parameterizes modules that do not need reprogramming and produces a technical specification of the functional and data requirements for modules that need reprogramming	It produces a specification of the functional and data requirements in a technical, unambiguous language as a reference for code development
Phase 3: code development and verification	It develops and verifies software code for modules that need reprogramming	It develops and verifies software code according to requirements specifications
Phase 4: testing and installation	It tests all modules against requirements as well as quality parameters	It tests code against requirements as well as quality parameters

Figure 3.3: Implementation phases of ERP

The next part of the thesis will take a closer look at the different implementation steps of a SAP system described in figure 3.3. Because the thesis is about business process modeling, it will focus more on the first step. Afterwards Phase two is described briefly. Phases three and four will not be discussed in this thesis. The first phase of the implementation of an ERP system is the requirements analysis and specification. This step searches an proper ERP system that meets the requirements of the company. Figure 3.4 gives an overview of the selection and implementation of the SAP system (Štemberger and Kovačič, 2008). The figure shows us, that the company first needs to define the current business needs and strategy of the organization. Afterwards it needs to make an overview of the capabilities of the different ERP standard packages. These packages will be compared with each other and the organization searches for the ERP package that has the capabilities to fulfill their business needs.

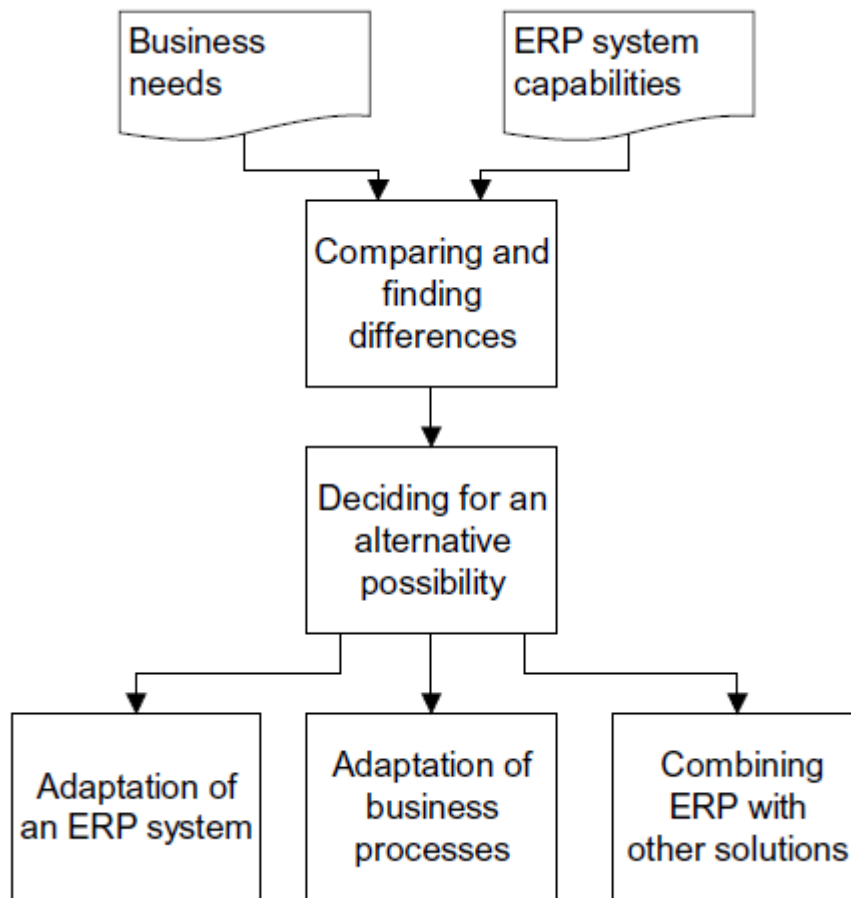


Figure 3.4: The selection and implementation of an ERP system

Like mentioned above, these ERP system are standard packages, so step 2 of figure 3.4 will be to compare the chosen ERP packages with the perfect ERP package for our processes. The organization need to make an overview about the changes that need to be made so that the ERP system fits into the business processes. The last step of figure 3.4 show that the organization has three options when they want to implement the chosen standard ERP system. They can customize their ERP system and so adapt it to the current business processes, they can adapt the business processes to the new ERP package or they can combine both scenarios above (Štemberger, and Kovačič 2008) (Dalai, Kamath, Kolarik and Sivaraman, 2004) .

The second and last phase of the implementation of an ERP system, that is going to be discussed, is the conceptual design. This phase parameterizes the modules of the ERP package that doesn't need to be reprogrammed to the business processes. For the modules that need to be adapted, the

conceptual design phase will deliver the functional and data requirements, so that the IT-crew can reprogram the modules (Francalanci, 2001).

3.4 Benefits of business process modeling when we implement a SAP system.

Now that the benefits of business process modeling, the implementation phases of an ERP system and the pitfalls of the implementation are known, it's easier to explain which services BPM can offer when an organization implements a SAP system. This part of the chapter gives an overview of the services business process modeling offers when we implement a SAP system and it will describe these benefits briefly.

3.4.1 Better package selection

One of the most important services of BPM is that the system provides the organization the chance to make a better and more careful package selection. The first step of business process modeling is to better understand the current business processes and the business strategy. The organization also needs to analyze the different options within an ERP system and compares this with the needs of the organization from step one. This can help the organization when they are choosing an proper ERP system (Soffer, Golany and Dori 2003). According to Somers and Nelson (2001) careful package selection is one of the critical success factors when we are implementing an ERP system. When an organization uses business process modeling before it selects an ERP package, the company has more information and less guess work is needed, so they have more chance for a successful SAP implementation.

3.4.2 Change management

The second service that will be discussed is that BPM supports change management. An organization that plans to implement an enterprise resource planning system need to make a lot of changes. Some companies prefer to adapt their business processes to the chosen ERP package. This means that the organization needs to change their current business processes and it can lead to a change of

procedures the employees normally follow. Business process modeling supports the management to avoid resistance or confusion of the employees. (Somers and Nelson, 2001)

3.4.3 Supporting the re-engineering

Business process modeling supports the re-engineering step of the current business processes. This thesis already mentioned that most companies need to adapt their business processes or customize the ERP package to get maximum profit out of the system. Business process modeling gives organization the chance to analyze their current business processes. Therefore the organization will have a better understanding of what can and need to be changed when we are implementing an ERP system and why it needs to be changed. This makes it easier to re-engineer these different processes. (Parr and Shanks,2000)

3.4.4 Provide a new way of doing business

The next service of business process modeling is that modeling offers the organization another method to do business when they implement an ERP system (Parr and Shanks, 2000). Like mentioned before, business process modeling analyzes the current processes of the organization and this gives a better understanding of the organizational activities (Childe, Maull and Bennett, 1994). Understanding these processes makes it easier to change processes quicker and to find new opportunities or spot business challenges. This can lead to another way of doing business. For example BPM spots that inventory of raw material can be reduced if the organization implements a module of an ERP package that facilitates communication with the suppliers. So the organization implements this module and instead of ordering every month the same amount, the supplier can follow the organizations inventory. So we can say that BPM offers the organization alternatives for doing business when they implement the chosen ERP system.

3.4.5 Better communication

The last services that we are going to discuss briefly is that BPM offers the organization the chance for better communication. As mentioned in the previous sub question, communication is a critical success factor when a company is implementing an ERP system. Good communication facilitates the implementation of a SAP system. It makes it easier to find problems in plans, to eliminate these errors and to inform the people (Slevin and Pinto , 1986). The part of the benefits of BPM showed that business process modeling facilitates the communication and so we can conclude that that better communication is a service that is offered by business process modeling.

3.5 The disadvantage of business process modeling

So far this chapter only discussed the benefits or advantages of business process modeling, so the question is why are not all companies using business process modeling. This section of the chapter gives an answer to this question, it shows some of the most important disadvantages of business process modeling. Business process modeling has some important disadvantages, This part will describe the three most important disadvantages of business process modeling, namely that designing a new business process model is complex, time consuming and it is an error prone task (Markovic, Costa Pereira and Stojanovic, 2007) .

3.5.1 Complexity of business process modeling

The first disadvantage of business process modeling is that it can be quite complex. Complexity has some unwanted effects on the organization, it leads to incorrect business process models and makes it hard to understand these business process models (Cardoso, Mendling, Neumann and Reijers 2006). Especially bigger companies who have a lot of business process deal with this problem. They have so much process that it looks like a jumble. So designing a new business process model can be very hard and complex.

3.5.2 BPM is error prone

The next point is that business process modeling is an error prone task. This means that the slightest mistake can lead to a different model and therefore it can be wrong for the organization. So the organization, who chooses to use business process modeling when they implement an ERP system, needs to be very careful during the design of this new model. The organization wants to implement the ERP system that way that they can maximize the efficiency and profit of the company. They want to be more competitive and as mentioned before a slight mistake can lead to another model. This other model may lead to failure of achieving these goals. (Kesari, Chang and Seddon, 2003)

3.5.3 Time consuming

The last disadvantage that is discussed is that BPM is very time consuming. The previous two disadvantages tell us that we need to be careful and concentrated when we are designing a new model for our organization. Because business process modeling can be complex and it is an error prone task, the organization needs to take its time when they use BPM. So we can say that it's very time consuming. Organizations can win a lot of time when they use ad hoc implementation instead of business process modeling. (Kesari, Chang and Seddon, 2003) (Indulska, Green, Recker and Rosemann , 2009)

3.5.4 Conclusion

All of these disadvantages make it more expensive for a company to implement an ERP system. Because of the complexity of business process modeling, the company needs more time and more intelligent people to design the correct business process models. The same reasons can told about the fact that business process modeling is an error prone task. The time consuming factor confirms that business process modeling is much more costly than implementing an ERP system without using BPM. So all these previous disadvantages make that business process modeling has a serious big price ticket when we implement a SAP system.

3.6 Conclusion

This chapter showed that business process modeling can be a good support for an organization when they implement an ERP system. It can offer a lot of services that influence the outcome of the project positively like better ERP package selection, better communication,... . But there are also downsides of using business process modeling (Complex, time consuming and error prone). If these disadvantages can be reduced, business process modeling has a bigger chance to lead the implementation of a SAP system to success. The next chapter tries to reduce these disadvantages by creating a framework for using business process modeling when implementing an ERP system.

Chapter 4: The methodology for using BPM when implementing a SAP system

The previous chapters told us that companies need to be careful when they are implementing ERP systems. Organizations can make a lot of mistakes when they implement this kind of system and business process modeling can offer a solution to prevent some of these pitfalls. But the previous chapter also showed that business process modeling can be very costly and time consuming. The time that is needed for business process modeling can be reduced if there was a kind of framework that can be followed. So this chapter investigates if there is a standard pattern or guideline that can be followed for business process modeling. To get a better view on this business process modeling phase, a tutorial of SAP Netweaver is followed.

This chapter links the methodology of business process modeling with this tutorial. Afterwards it tries to discover and understand a framework for using business process modeling when the organization is implementing an ERP system. The last step is to give an overview of the different steps of the framework and every step will be discussed briefly.

4.1 The link with the tutorial of SAP Netweaver

Like mentioned above, this tutorial has been followed to get a better view on business process modeling. This may help to discover and understand the steps of business process modeling that are necessary when an organization implements an ERP system. That way patterns or guidelines for BPM can be revealed. Not the whole tutorial will be discussed, only the parts of the tutorial that are necessary for this chapter. For this tutorial, the program SAP Netweaver CE7.2 is used and this tutorial is made by Venky Shankararaman, 2010. The title is 'Create a Process-Driven Composite Application with CE 7.2'.

4.1.1 What is SAP Netweaver?

SAP Netweaver is a software program that helps the organization with the integration and development of a disparate system (example ERP system) with the current business process of this organization (Heilig and Karch, 2000). SAP Netweaver is divided into 5 different composite application layers. An overview will be given in the next part.

4.1.2 The composite application layers

This part gives an overview of the five different composite application layers. Figure 4.1 show us these different layers. These layers are the portal, process, user interface (UI), business logic and the back end layer. This thesis is about business process modeling and this chapter aims for the parts of the tutorial that are useful for the methodology of this business process modeling, therefore only the process layer is going to be discussed briefly in this chapter.

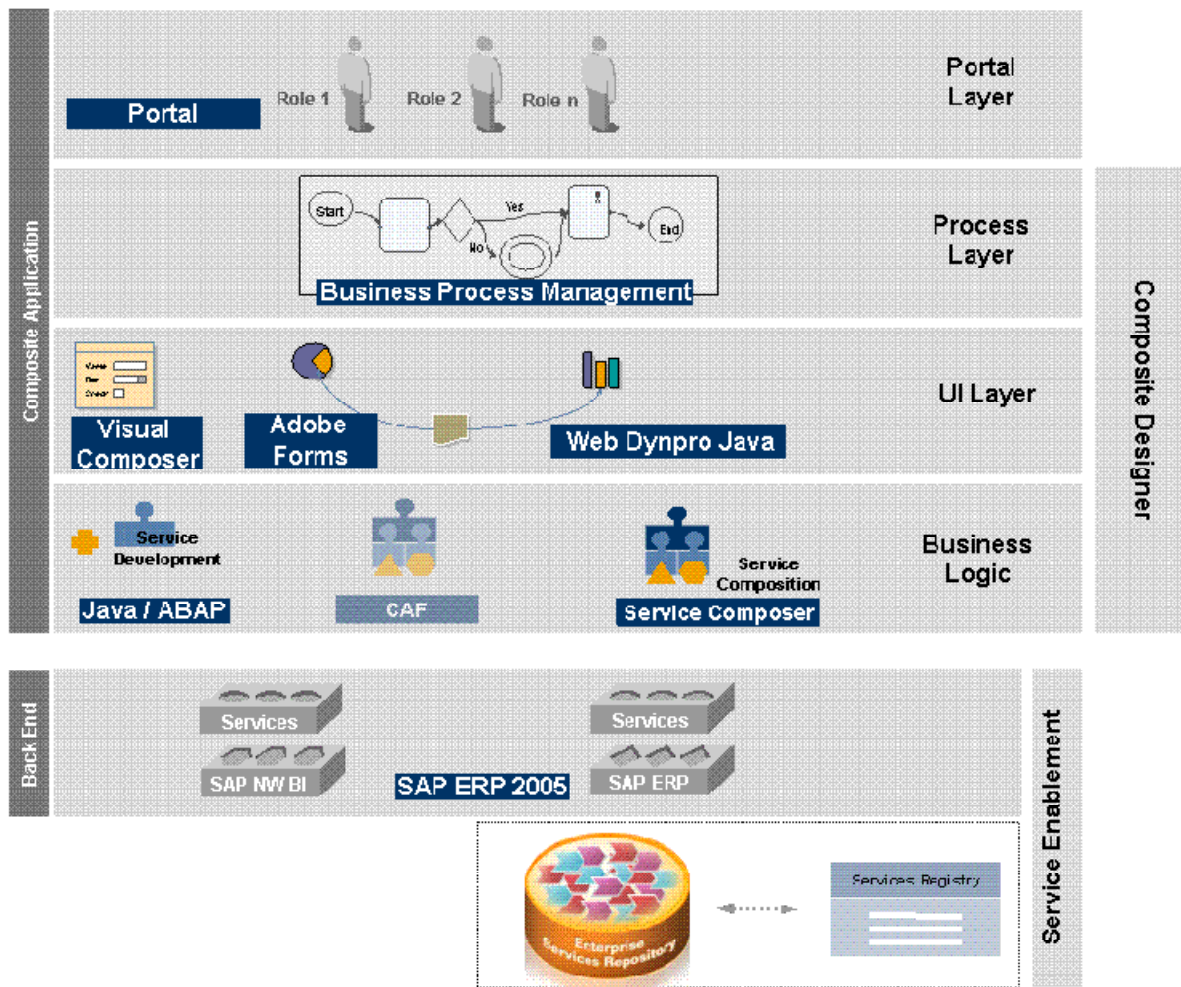


Figure 4.1: The composite application layers

4.1.3 The process layer

Like mentioned above, the interest of this chapter is with the methodology of business process modeling and therefore only the process layer is going to be described. The process layer defines the organizational process steps, the sequence in which they are executed, the roles that execute these activities, and how the data of the processes is passed between the organizational process steps. This layer uses the process composer as tool and this tool supports all phases of the process modeling and process development. Part 1 of the tutorial starts with the results of the analysis of the process layer and the part explains how an organization can use this process composer tool to represent these results into business process modeling notation (BPMN). BPMN allows easy and intuitive process

modeling for both the business process analysts as for the developers in the organization. BPMN will be discussed further in the chapter of the business process modeling languages. (Shankararaman, 2010)

4.2 The framework for using BPM when implementing an ERP system

The next objective is to form a framework that supports future business process modeling when an organization wants to implement an ERP system. This part gives an overview of the necessary steps of business process modeling when the organization implements an ERP system. Figure 4.2 shows us the ERP lifecycle model according to Ahituv, Neumann and Zviran (2002).

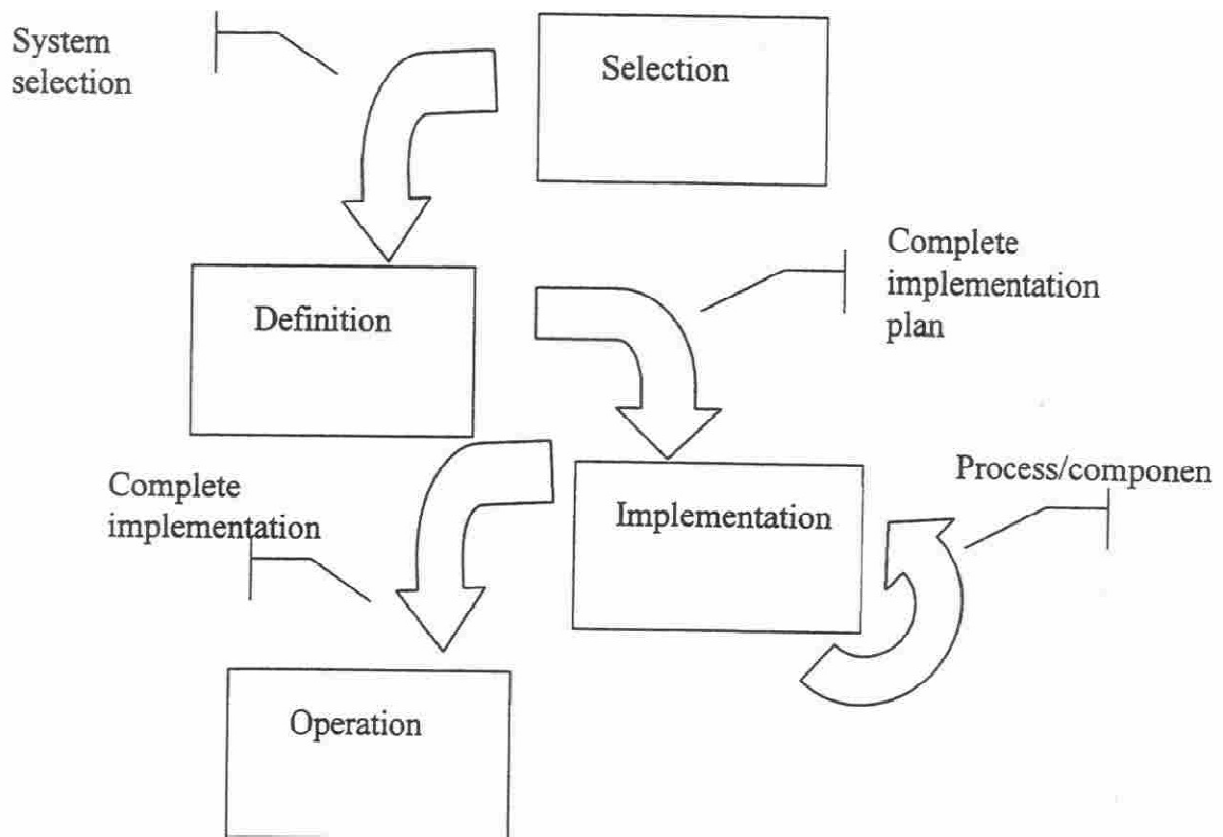


Figure 4.2: The ERP lifecycle model

Figure 4.2 shows that before an organization can operate the new ERP system, they need to select define and implement it. So the first step is the selection of the new ERP system. It needs to choose the appropriate ERP package, what modules do they want to implement and if they need to customize this ERP package. Figure 3.4 in the previous chapter presented the steps for the selection and implementation of an ERP package. Before the organization can make a good selection and implementation, it needs to find the business needs (Štemberger and Kovačič, 2008). To find these business needs, the organizations has to know the current situation in the company and they need to know where they want to go to. These two steps are shown in figure 4.3. This figure shows a framework, according to Štemberger and Kovačič (2008), that can be used if we use business process modeling when the organization implements an ERP system. All of these steps will be described and explained in the following points.

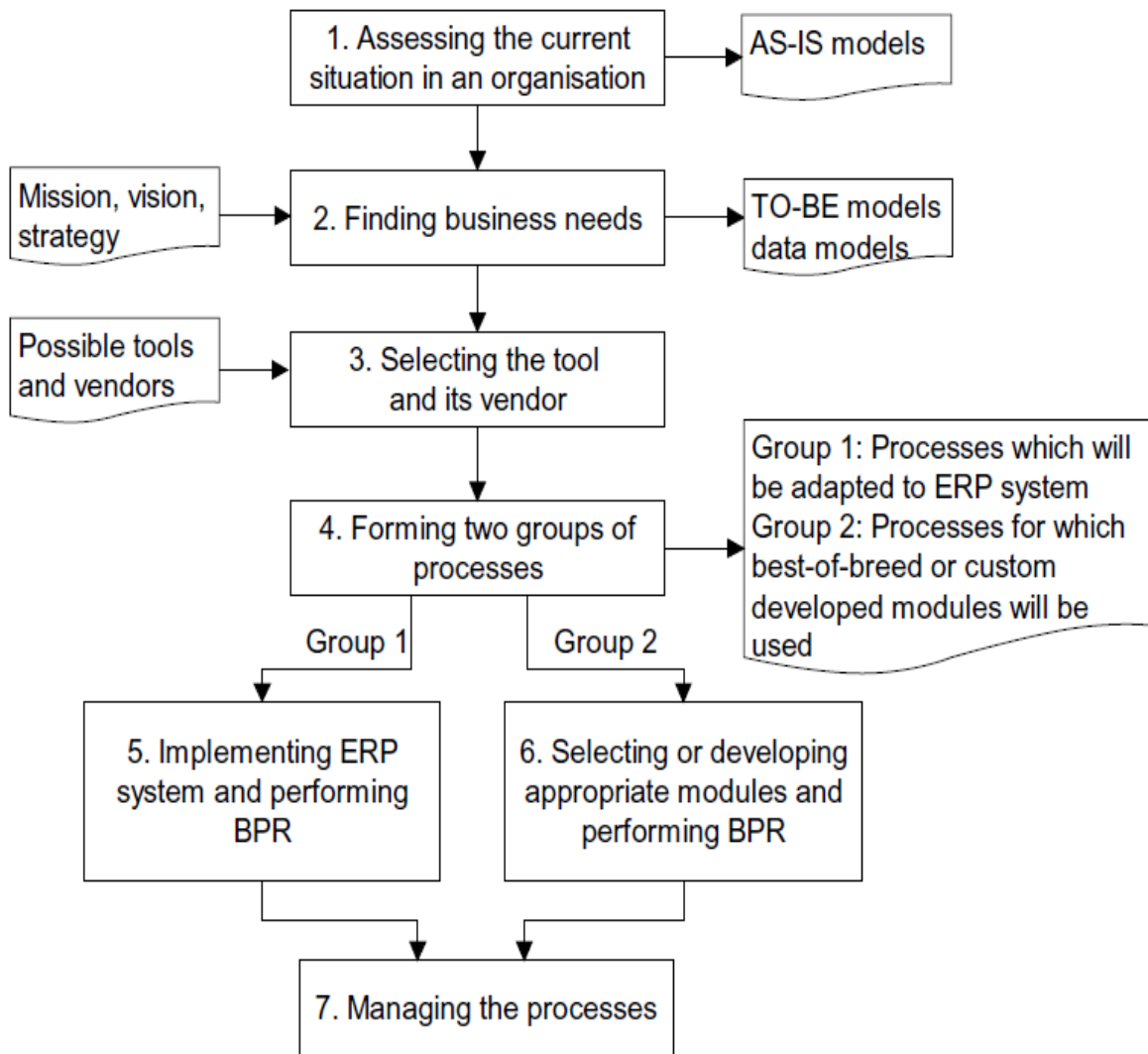


Figure 4.3: The framework for using BPM when implementing an ERP system

4.2.1 Assessing the current situation

The last section already revealed that the first step of business process modeling when an organization wants to implement an ERP system, is to assess the current situation of the company. As is shown in figure 4.3, the outcome of this step is called an AS-IS model. So the company has to represent the current situation without the changes of the ERP system. To do so the organization needs to analyze the current business processes. This business process analysis will be described in three parts, the first part links this analysis with the tutorial of SAP Netweaver, the next part

describes two methods that can support the analysis and the last part describes the analysis with business process modeling in three different levels.

The first part links the analysis with the tutorial of SAP Netweaver. This tutorial of SAP Netweaver showed that the process layer can be useful when an organization tries to analyze their current business processes. This layer defines the organizational process steps, the sequence in which they are executed, the roles that execute these activities, and how the data of the processes is passed between the organizational process steps. This can be very helpful when the organization wants to make a model of the business processes in the organization and documents these business process models. Part 1 of the tutorial also learned us how to use the process composer tool to model these analyzed processes in the business process modeling notation (BPMN). This part of the tutorial will be discussed further in the chapter of the business process modeling languages. (Shankararaman, 2010)

According to the article of Celino, Alves de Medeiros, Zeissler, Oppitz, Facca and Zoeller (2007), process mining and reverse business engineering are the ideal supporting techniques to represent this current situation. Process mining is a method that is more focused on discovery. The method tries to answer questions like: “What are the business processes and how are they executed?; Is there a particular model for these business processes?; Where are the bottlenecks?”. So process mining gives us information about the current business processes and where we can improve these processes. The second analysis method is reverse business engineering. This technique has two main purposes. The first purpose is to make an AS- IS analysis, this means that the method makes a model using the system elements that are revealed during the analysis. The second purpose of reverse business engineering is to gain information about the potential within an ERP system. This makes it possible to redesign and improve the current business processes and to customize the ERP package to the organizational processes. (Celino, Alves de Medeiros, Zeissler, Oppitz, Facca and Zoeller, 2007)

The last part of this step is the analysis of the current business processes. According to von Halle and Goldberg (2009), the analysis of a business process has to be performed on multiple levels. They demonstrate that there are three different levels on which organizations analyze the current business processes with business process modeling. These three levels are the strategic level, the tactical level and the operational level. All of these levels are required to get a good view on the current business processes.

The first step of the analysis is to fulfill the analysis at the strategic level. At the strategic level of business process modeling, the organization has to answer the question 'What does our business do?'. This level tries to find a strategic alignment between the business context and the business processes. A technique to clarify the strategic level of the analysis is to make a distinction between the core, the support and the management business processes. Core business processes are processes that deliver value for the customer. Support business processes are processes that deliver value to the organization by supporting these core business processes. As last management business processes, these processes help the organization manage the core and support business processes and they only deliver value for the management. At the end of this paragraph an example is shown to illustrate the different business processes. To create a clear overview of the strategic level of the business processes, the organization has to recognize these various processes in their company. (von Halle and Goldberg, 2009)

Example: The organization is a student brasserie.

Core business processes : Provide cheap meals, quick service and provide students a good time.

Support business processes : Purchase of raw material, prepare menus in front and provide entertainment.

Management business process : Financial accounting and human resource planning.

The second step is to take a look at the tactical level of the business processes. The tactical level describes the end-to-end business process and the level shows us what happens in these business processes, not how it happens. So the tactical level doesn't go into detail. At the tactical level the organization describes the way it does business independent of tools or labor and focusing on the objectives of this organization. An example can be making coffee, a cowboy has a different way of making coffee than an Eskimo. But they both boil water and add coffee, so these two processes are business processes that occur at the tactical level. (von Halle and Goldberg, 2009)

The third and final step of the analysis of the business processes is BPM at the operational level. The operational level describes just like the tactical level the end-to-end business processes, but unlike the tactical level, the operational level wants to know how we get to our end-result. So this level is described more into detail. This more detailed view represents the current business processes of the

organization. So the outcome of the BPM at operational level is the required AS-IS model of this organization. The example of making coffee becomes more detailed at the operational level. The business process for the cowboy is being extended. Now the cowboy has to search for wood, make a fire, boil the water, grind the coffee beans, add this grinded coffee to the water and filter this. (von Halle and Goldberg, 2009)

4.2.2 Finding the business needs

The next step of the BPM methodology is to find the business needs. In this step the organization searches for the reason why they want to implement an ERP system, in other words they have to figure out where they want to go to with the company and how they will do get there. Figure 7 indicates that this step has two inputs namely, the business processes of the current situation and strategic information like vision, mission and strategy. Previous step already made an AS-IS model which contains all the necessary information about the business process of the current situation in the organization. So the next phase is to examine the organization to find the strategic information of the company. Like mentioned above the organization needs to describe the vision, mission and strategy of the company. (Štemberger and Kovačič, 2008)

The first stage of finding the necessary strategic information is to describe the vision of the organization. The vision tells us where the company wants to be in the future. A good vision can't be too ambitious or too easy to reach, it needs to be a challenging but feasible goal. A good vision gives direction and it can motivate employees to achieve these goals. When the vision is achieved, the company loses its driving force for action and it can become directionless, so a new vision should be chosen (Smit, 1999). If we use the example of the student brasserie, a possible vision could be to be a highly profitable, cozy place where most students love to hang out.

The second stage of the strategic information is to describe the mission of the company. The mission tells us what the business does on a day to day basis. A mission describes the organizational character, identity and reason of existence. Unlike the vision, an organization can keep the same mission even when they already achieved this mission. So the mission of an organization is a timeless explanation of the what the company does and its ambition (Smit, 1999). For the example of the

student brasserie, the mission can be to provide these students a cheap meal, fast service and a good time.

The last stage of finding the strategic information is the strategy. The strategy of a company shows us how the organization plan to achieve this vision and mission. It tells what actions the organization takes to achieve this vision and mission (Smit, 1999). For the example of the student brasserie, a strategy could be that there is a day menu which is cheaper than the other dishes. This gives the brasserie a better view what they need to prepare more in front. Therefore faster service is possible. Another strategy can be to implement a happy hour from 17-18h, this will attract more student just before dinner time and it may lure more eaters.

Now that the organization knows the current business processes and the strategic information of the company, they can start with finding the business needs. As mentioned in the beginning of the section, the organization needs to find the reason why they want to implement an ERP system. So we need to find the objectives of the organization. The strategic information ,discussed earlier in the section, gives the company the opportunity to described these objectives (Reid, 1989). A lot of companies make the mistake of making their objectives to vague, this can have a disastrous effect for the organization. These effects were discussed earlier in the chapter of what can go wrong when we implement an ERP system. Therefore the organization has to make sure that they have good objectives. A convenient method to see if the objective is good or vague is the S.M.A.R.T. criteria. S.M.A.R.T. stands for specific, measurable, achievable, relevant and time based. A good objective has to meet all these five requirements and therefore the next part will give a brief description of the five requirements. (Doran, G., 1981).

The first requirement is that the objective has to be specific. Like mentioned in the chapter of what can go wrong when implementing a SAP system, the organization has a much bigger chance of success when they have clear goals and objectives. The objectives need to answer the question : “what, why, who, where and which ?”. A specific objective makes it easier for employees to understand what is expected from them. (Doran, G., 1981)

The second requirement is that the objective is measurable. If an objective isn't measurable, then the organization never knows how they are doing. The objective needs to be measurable, so that the company can adjust if they're going off track. (Doran, G. T. , 1981)

The achievability of the objective is the third requirement. Objectives need to be possible to achieve. If the organization takes an impossible objectives, the employees can get confused and demotivated. A too low objective also leads to a low motivation. Both of these poor objectives will lead to a loss of productivity and efficiency. So having a achievable goal can make a difference between success and failure. (Doran, G. T. , 1981)

The next requirement is that the objective is relevant. An objective need to be something at a meaningful level. According to Doran, G. T. (1981) a goal is relevant if you believe that it can be accomplished.

The last requirement is that the objective is time based. A good objective always needs to be fulfilled in a certain time frame. An objective need to start and end at the indicated date. But also here attention is needed when a time frame is chosen. The time frame can't be too long, because a deadline too far away is easy to put off and an unrealistic can be demotivating for the employees. Doran, G. T. (1981)

For the example of the brasserie, a potential objective could be that the brasserie wants to have a yearly profit of 100,000€ within five years from this date.

Now that the organization knows their current business processes and the objectives they can analyze where the weak points of the organizations are and what the company can do to improve these weak points. The reason why the organization needs to do this kind of analysis, is to find the business needs. These business needs show what the organization wants to achieve with implementing the ERP system and on what areas they want to improve the company. To document these business needs, the needs are written down in TO-BE and data models. These models display the requirements that the ERP system need to fulfill to get maximum profit from the ERP system. Now that the organization knows the business needs, they can start with choosing the appropriate ERP package.

4.2.3 Selecting the ERP package and its vendor

Now that the business needs are represented by a TO-BE model, the organization needs to select the ERP package that is the most suitable to support this business needs. Figure 3.4 shows the different steps that an organization needs to follow when they are selecting an ERP package. These steps are already discussed briefly in the previous chapter, because this part is a vital part of the implementation of an ERP, this section will take a closer look at it. Not only the ERP package is important, but also the vendor of the package. The organization needs to take a look at the different services that the vendor offers and take this into account when they select a ERP package. The last part of this section tells that the ERP package is a standard package, this means that most of the companies don't have a ideal solution that fits perfect in their current business processes. So the organization has three options for the implementation of the ERP system.

Figure 3.4 showed that the first phase of the selection process was to find the business needs and the capabilities of the different ERP packages with the services of their vendors. Previous part explained how an organization can find the business needs and the outcome of this part is the TO-BE model of the company. So to complete this phase, an overview of the capabilities of the different ERP packages and the services of their vendors has to be made. This phase begins collecting information about ERP packages and vendors, this can be done by contacting several ERP vendors and asking them to send some information, professional literatures, conferences and professional fairs. This information will be bundled and an rough overview of the capabilities of the different ERP packages and the services of the vendor is created. The information gathered from these activities will be given to the steering committee of the project. This committee will study this information and they will eliminate all the ERP packages that can't fulfill the business needs. After this actions the steering committee sends new information requests to the remaining vendors. These requests ask for more detailed information and with this new, more detailed information, the committee makes a new improved overview of the information of the remaining ERP packages. This information contains the capabilities of every remaining ERP package. (Ahituv, Neumann and Zviran, 2002) (Štemberger and Kovačič, 2008)

The next phase of the selection process is to compare and differentiate these ERP packages. This phase starts with the overview of the information made by the steering committee, this overview will be compared with the TO-BE models created in the part of finding the business needs. After this

comparison, the organization must reduce the amount of vendors between three and five. These remaining vendors may present why the company should buy their ERP package and what services that they can and will offer for the company. The last step in this phase is that the organization chooses an ERP package. (Stefanou, 2000) (Štemberger and Kovačič, 2008)

The last phase of the selection process shows that the organization needs to make adjustments before it can implement the ERP package. The ERP package is a standard package, this means that most of the companies don't have a ideal solution that fits perfect in their current business processes. So the organization has three options for the implementation of the ERP system. They can chose to customize the ERP package and so adapt the ERP package to the current business processes, they can choose to adapt the current business processes or they can choose to combine both previous scenarios. Customizing the ERP package completely is very time consuming and cost a lot of money and therefore almost no company uses this adaption method. Also adapting only the current business processes is very difficult if the organization needs to change core processes or processes that can't be adapted or eliminated. So most of the ERP implementations combine these two scenarios and therefore only the third options is included in the framework of figure 4.3. (Francalanci, 2001) (Dalai, Kamath, Kolarik and Sivaraman, 2004)

4.2.4 Forming two groups of processes

Like mentioned above, the most of the ERP implementations combine the customization of the ERP package and the adaptation of the current business processes and therefore this chapter will only discuss this option. This step divides the processes into two different groups. The first group are the business processes that are going to be adapted to the ERP system and the second group are processes wherefore modules of the ERP package are customized. Support processes are processes that deliver value to the organization by supporting these core business processes (von Halle and Goldberg, 2009). These processes are easy to adapt and therefore they belong to the first group. Core processes can belong to both the first group as to the second group. If the organization wants these core processes to be unique and flexible, then they will put the process into the second group. But companies may acquire better business process from the ERP system and it is much more costly and time consuming to customize these modules than to adapt the core business process. (Štemberger and Kovačič, 2008)

4.2.5 Implementing the ERP system and performing BPR

The next step is to implement this ERP system into the organization. This step only describes the implementation with the business processes of the first group. The first phase of this step is to do a gap analysis. This gap analysis makes it possible to investigate if the ERP system fits with the organizational requirements. Because the business processes that are analyzed are from the first group, they need to be adapted to the ERP package. So if the package doesn't fit, the organization needs to reengineer the business processes that cause this problem. The activity of reengineering business processes is called business process reengineering (BPR). This step can lead to remarkable changes of the business processes and can be very complex. Therefore a high level of top management and employee involvement is required. (Ahituv, Neumann and Zviran, 2002)

4.2.6 Selecting or developing appropriate modules and performing BPR

This step represents the implementation and BPR of the second group. The first phase of this step is to investigate which modules of the ERP package doesn't fit into the business processes and thus which modules that need to be customized. Customizing ERP modules offers the organization the chance to have unique and flexible business processes, but customizing can be a very time consuming and costly process. Therefore organizations have to customize the modules, if the process is a core process that needs to be unique and flexible. (Štemberger and Kovačič, 2008)

4.2.7 Managing the processes

The last step of the framework is called managing the processes. This step is a step that continues forever, this is the step that includes the measurement and the continuous improvement of the business processes. To be competitive a company can't stand still, it needs to improve continuously. (Štemberger and Kovačič, 2008)

4.3 Conclusion

This chapter gave an overview of the methodology for using BPM when implementing a SAP system. The chapter used the framework for implementing an ERP system according to Štemberger and Kovačič (2008), to take a closer look at the different steps that have to be taken when implementing an ERP system. Business process modeling plays an important role in this framework. BPM starts with showing the current business processes in an AS-IS model, which makes it easier to understand the current situation. This AS-IS model is together with the strategic information the key component to find the business needs of the organization. These needs are documented in a TO-BE model. These two models lead to a better selection of the ERP package and as discussed earlier, this selection is a critical success factor of the ERP implementation.

Chapter 5: What Languages are used for BPM?

The previous chapters already gave an overview of the pitfalls of the implementation of an ERP system. It described the business process modeling as a possible solution to overcome these pitfalls. It gave an overview of the services that business process modeling can offer when the organization wants to implement an ERP system. The previous chapter described the methodology for using business process modeling when the company wants to implement an ERP system. The last step before the conclusion is to look at the languages of BPM.

The last chapter before the conclusion is about the different languages that are used for business process modeling. This chapter will give an overview of the most important languages and it will briefly describe these different business process modeling languages. Afterwards a short overview is presented of the advantages and disadvantages.

5.1 The different languages

Before this chapter can describe the languages that are used for BPM, this part needs to give an overview of the most common business process modeling languages that are used when an organization wants to implement an ERP system. The business process modeling is supported by a mix of languages, these languages can work together to represent the current business processes. They provide the organization with a better understanding of these processes. Below is a summation of the most common business process modeling languages.

These business process modeling languages are:

- Business process modeling notation (BPMN)
- Unified modeling language (UML)
- Business process execution languages (BPEL)

These different business process modeling languages will be explained in the following parts. The purpose of this chapter is to investigate if all these languages are necessary, to understand why these languages are necessary and to investigate if the different languages makes BPM more complex. The following parts make it possible to answer these questions.

5.2 Business process modeling notation

The first BPM language that is going to be discussed is the business process modeling notation (BPMN). This section will be divided into three small parts. The first part explains what BPMN is and how it can be used. The second part refers to the tutorial and shows how a business process can be documented with BPMN. The last part shows the advantages and disadvantages of BPMN.

5.2.1 What is BPMN?

BPMN offers a standard visual notation that can represent the current business processes of an organization, defined in an executable process language. The object of BPMN is to support business process management. This notation is a standard language which can be understood by both the technical users as the business users. It also provides a mapping for the business process execution language (Recker and Mendling, 2006). To make this graphical representation, the symbols of the business process modeling notation need to be known by the designer of the notation. As last step in this part, a brief overview of the most important flow objects of BPMN will be given below.



Figure 5.1: The event in BPMN

The first flow object is called an event. Figure 5.1 illustrates an event. There are three kind of events, starting at the left is the start event, in the middle is the intermediate event and at the right of figure 5.1 is the terminate event. An event causes an action in the business process. (White, 2004)



Figure 5.2: The activity of BPMN

The second flow object is called an activity. Figure 5.2 illustrates this activity. An activity describes the work that the company needs to do in the business processes. (White, 2004)

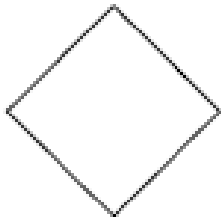


Figure 5.3: The gateway of BPMN

The last flow object is called the gateway. Figure 5.3 illustrates this gateway. A gateway present the decision that need to be made in the business processes. (White, 2004)

5.2.2 The link with the tutorial of SAP Netweaver

The tutorial uses the process composer tool to create the graphical notation of the business processes based on BPMN. Part 1 of the tutorial of SAP Netweaver shows an example of business processes that is documented in the graphical notation BPMN. Therefore a quick overview of this example is given in this part of the chapter.

The example uses simple standard purchase approval Process that is widely used in many organizations. This example is shown in figure 5.4. The figure gives the graphical notation, based on the business process modeling notation, of the business processes that are necessary in the purchase approval process. The next paragraph will give an overview the solution of this example.

Figure 5.4 gives the solution of the example described above. This paragraph will describe this solution. Because every business process needs a start, the tutorial starts at the top with an a start event. This start event has an envelope in it, this means that the business process starts with a message. In this example the message can be a warning that inventory is low. The second step is to create an activity. The tutorial mentions that the employee needs to create a purchase request. So the created activity is called create purchase request. In the upper left corner of the activity is shown

an image of a men, this means that the process is performed manually. When this step is created, a decision need to be made whether the purchase request is approved or not.

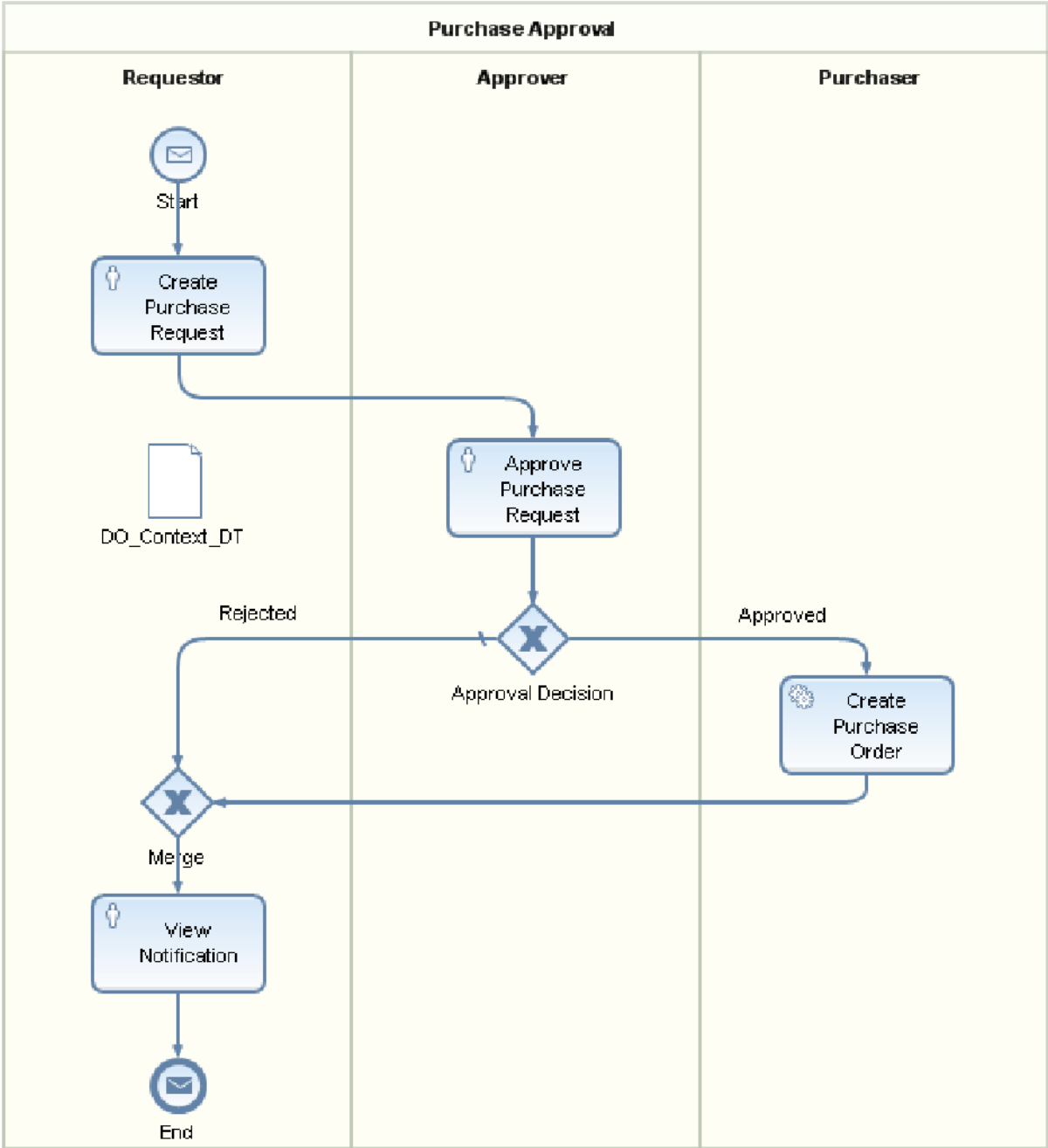


Figure 5.4: The BPMN of a simple standard purchase approval process

The theory showed that an activity and a gateway are necessary to make a decision (von Halle and Goldberg, 2009). In the example, the activity of the decision is to approve purchase request. The gateway splits the path for the request that are approved and the request that are rejected. If the gateway is approved, an activity need to be made for creating the purchase order. This activity is done automatically and the symbol to show this is an icon with two gears. After this step the process goes to a XOR-gateway to merge again with the rejected requests. This gateway gives a signal to the activity 'view notification' if one of the requests arrives in this gateway. When the notification is viewed, the business process can be ended with an end event.

This tutorial gave an overview of business process modeling notation and the elements of this language. The author of this tutorial is Shankararaman (2010) and the whole section of the link with the tutorial of SAP Netweaver has this reference.

5.2.3 The advantages and disadvantages of BPMN

The last part of this section will give an overview of the most important advantages and disadvantages of BPMN. This part starts with the two most important advantages. The first advantage of BPMN that is going to be described is the readability of the BPMN. BPMN is easy to understand for people from both the technical department as the management department , the graphical notation is also understandable by stakeholders. This means that BPMN can improve the communication and the cooperation in the company since the whole organization understands the business processes and knows what needs to happen. The other advantage is freedom, BPMN is implemented in more and more tools and so more reference models are available for the organization. These models support the creation and understanding of the models described in BPMN. (Blox, 2009)

This part will describe the most important disadvantages of the business process modeling notation. The first disadvantage is that improper modeling can lead to deadlock situations. This disadvantages is caused by the freedom described in the part of the advantages. So an extra check for feasibility is necessary when an organization uses BPMN. The second disadvantage is that mistakes in the models of BPMN are the hardest and most costly mistakes to correct. To overcome this disadvantage,

organizations need to do a formal analysis before they start with BPMN. The last disadvantage are the BPMN dialects. These dialects arose because of misuse of the elements of BPMN. Business analysts misuse elements to make the BPMN models easier to understand and to read. This leads to more dialects and thus the language is becoming less standard and harder to understand for developers. (Blox, 2009)

5.3 Unified modeling language

The second language that is going to be discussed is the unified modeling language (UML). This section is divided into two small parts. The first part will explain what UML is and give an example of this language. The second part will give a short overview of the most important advantages and disadvantages of UML.

5.3.1 What is UML ?

UML is a standard visual modeling language. UML is especially designed for software system development, but these days organizations can use UML for modeling business processes. Figure 5.5 shows an example of an UML diagram and this figure reveals a connection with BPMN. The figure shows that BPMN and UML have similarities. It shows that the flow objects of BPMN and UML are the same. The big difference is that the UML diagrams are an execution-oriented language and BPMN models can't be directly executed. So the BPMN models need to be redefined to BPEL processes, while for UML, tools are developed that can execute the processes. In other words BPMN is designed with the purpose to aim for high-level modeling and UML is designed with the purpose to aim for a more detailed modeling. (Xinming and Haikun, 2006) (Clark and Evans, 1997)

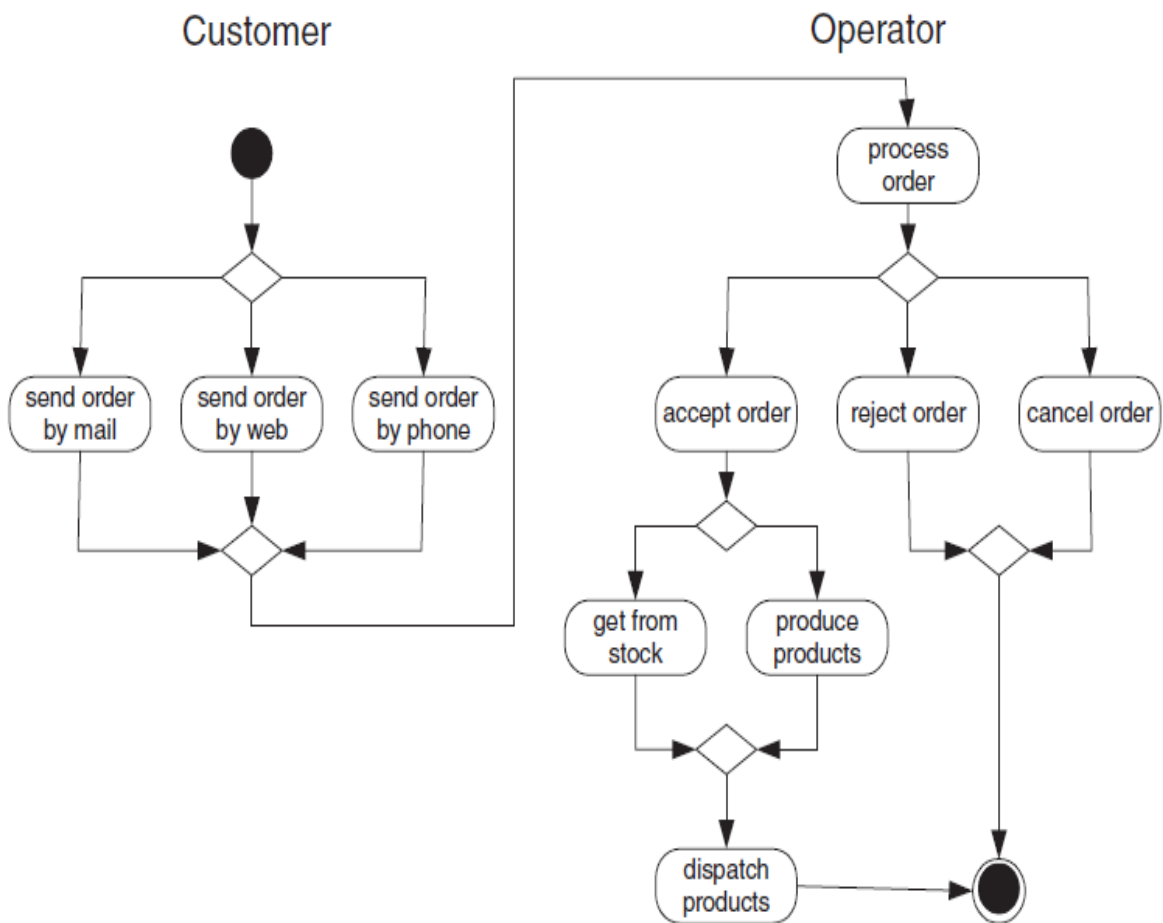


Figure 5.5: An example of an UML diagram

5.3.2 The advantages and disadvantages of UML

This part will describe the most important advantages and disadvantages of the unified modeling language. The part starts with describing the most important advantages. The first advantage of UML is that UML gives a greater chance of survival when an organization starts a new project. UML increases the work and design capabilities of the organization when they start a new project. So more opportunities for the organization and this lead to an bigger chance of success. Another advantage is that the organization can use the tools of this UML. Like mentioned above, more tools

means more options and one of these options is to create the documentation during the development process. (Kušek, Dešić, Gvozdanović, 2001)

UML however also has a few disadvantages, despite its excellent use as business process modeling tool. Among these are its insufficient differentiation between data - and control flow and its lack of operators for event handling in activity diagrams. Also a lack of facilities for the modeling of resources (people, roles, organizational units) and their relation to the activities is a UML's shortcoming. (Clark and Evans, 1997)

5.4 Business process executable language

The third languages that is going to be discussed is the business process executable language (BPEL). This section will give an overview of BPEL. It's divided into three parts. The first part explains what BPEL is, the second part gives a brief overview of how to map BPMN to BPEL and the last part will show the advantages and disadvantages of the language.

5.4.1 What is BPEL?

The business process executable language (BPEL) is an XML-based execution language for representing the business processes. Like mentioned above, BPEL is an execution language, this means that it's a language for the technical analysts. The big difference between BPEL and BPMN is that BPMN is a graphical notation used as communication tool for business processes between business analysts and technical analysts and BPEL is the language that is necessary for the specifications of the business processes for the technical analysts. So BPEL is the language for the specification of the actions within business processes with web services. Therefore the business process execution language is also called web services business process execution language (WS-BPEL) Figure 5.6 shows the example of a complaint handling process in BPEL. (Blox, 2009) (Recker and Mendling, 2006)

```

<process name="complaint handling">
  <sequence name="tc0">
    <invoke name="register">
      <flow name="tc5">
        <sequence name="tc3">
          <invoke name="send questionnaire".../>
          <pick name="tc2">
            <onMessage operation="returned-questionnaire"...>
              <invoke name="process questionnaire".../>
            </onMessage>
            <onAlarm for='P14DT'>
              <empty/>
            </onAlarm>
          </pick>
        </sequence>
        <scope name="tc4">
          <onEvent Start(C4)>
            <invoke end(g1)/>
          </onEvent>
          <onEvent switch(g3,g1,NOK)>
            <invoke end(g1)/>
          </onEvent>
          <onEvent end(g1)>
            <sequence>
              <sequence name="tc1">
                <invoke name="process complaint".../>
                <invoke name="evaluation".../>
              </sequence>
              <invoke end(tc1)/>
            </sequence>
          </onEvent>
          <onEvent end(tc1)>
            <switch name="g2">
              <case condition="DONE">
                <invoke switch(g2,g4,DONE)/>
              </case>
              <case condition="CONT">
                <invoke switch(g2,a8,CONT)/>
              </case>
            </switch>
          </onEvent>
          <onEvent switch(g2,a8,CONT)>
            <sequence>
              <invoke name="check processing".../>
              <invoke end(a8)/>
            </sequence>
          </onEvent>
          <onEvent end(a8)>
            <switch name="g3">
              <case condition="OK">
                <invoke switch(g3,g4,OK)/>
              </case>
              <case condition="NOK">
                <invoke switch(g3,g1,NOK)/>
              </case>
            </switch>
          </onEvent>
          <onEvent switch(g2,g4,DONE)>
            <invoke end(g4)/>
          </onEvent>
          <onEvent switch(g3,g4,OK)>
            <invoke end(g4)/>
          </onEvent>
          <invoke Start(C4)/>
        </scope>
      </flow>
      <invoke name="archive">
    </sequence>
  </process>

```

Figure 5.6: An example of BPEL

5.4.2 Map BPMN to BPEL

The previous part mentioned that BPMN is used as communication tool between business and technical analysts and that BPEL is needed for the specification of the actions within the business processes with web services. So before the organization can implement their ERP system, they need to map BPMN to BPEL. This part will give a brief and simplistic description of how to map BPMN to BPEL. This part starts with describing the differences between BPMN and BPEL. Afterwards a brief overview is given how to change the BPMN elements to objects that can be used for the BPEL structure. Because there isn't a specific guideline for the following steps, the part will not continue to discuss what needs to happen with these objects.

The first step in this process is to find the differences between a BPMN model and a BPEL structure. The first big difference between BPEL and BPMN is that BPMN is a graphical notation used as communication tool for business processes between business analysts and technical analysts and BPEL is the language that is necessary for the specifications of the business processes for the technical analysts. Another difference is that both language are used in different phases of the implementation. BPMN is used in the design phase and BPEL in the implementation phase. The last big difference is that BPMN is a graphical notation used by business analysts and that BPEL is block oriented notation used by technical analysts and programmers. (Blox, 2009)

Previous paragraph described the differences between BPMN and BPEL, these difference need to be covered by this transformation method. BPMN uses business process diagrams (BPD) to describe their processes. Figure 5.7 represents the BPD elements in a class diagram. This diagram shows what the organization needs to map. They need to begin with indentifying if the activities of the BPMN model are events, tasks or gateways. Afterwards the organization needs to examine what kind of event, task or gateway the activity is. This activity will then be documented as an object. For example an intermediate timer events will be documented as the object \mathcal{E}_T^I . This makes the BPEL structure shorter and easier to understand. The documentation of this object consist of describing the name of the object, what object does and what steps that need to be done to fulfill and complete this activity. Now that the organization has described all its objects, it can continue with using these objects to create a new BPEL structure.

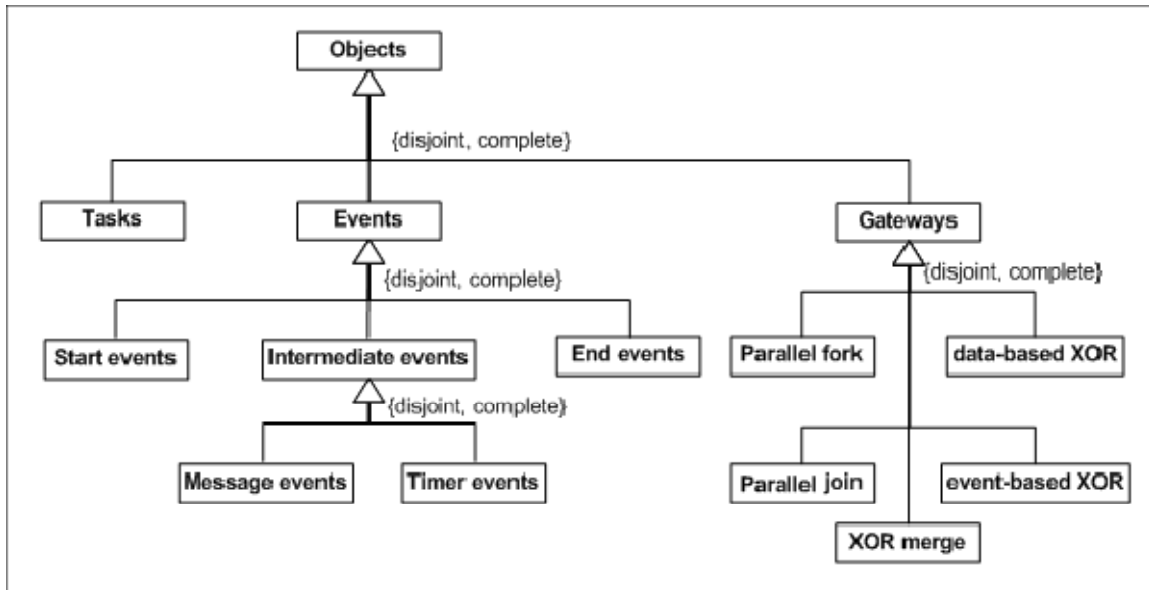


Figure 5.7: The BPD diagram elements

5.4.3 The advantages and disadvantages of BPEL

This part describes briefly the most important advantages and disadvantages of the business process execution language. The part starts with an overview of the most important advantages. The first advantage is that BPEL is a standard language, this means most technical analysts are familiar with this languages, which improves the communication and understanding of the business processes among these technical analysts. The second benefit of BPEL is that BPEL with web services offers the organization a way to get their existing legacy applications, without that this organization needs to change them out of their processes. This can save time for the organization during the implementation. (Recker and Mendling, 2006)

BPEL also has some shortcomings. One of these disadvantages is that BPEL doesn't cover some major workflow patterns. The most important workflow pattern that isn't covered is called the Milestones phenomenon. This phenomenon ensures that an activity can only start if the previous activity is finished. Milestones can be replaced by using a work-around, but this work-around is more complex and therefore improvement is useful. Another disadvantage is that one BPMN model can lead to

more BPEL structures. The control flow logic isn't strict enough. This makes it harder to create, read and understand the business processes. (Blox, 2009)

5.5 Conclusion

There are a lot of languages that can be used for business process modeling. This chapter only explains the three most common languages, namely BPMN, UML and BPEL. The chapter shows that these business process modeling languages (BPML) can work together to facilitate the business process modeling. BPMN is used to represent the business process at a high level that can easily be understood by business analysts and technical analysts. UML is mostly used for software modeling and it can be used for business process modeling at a more detailed level. BPEL is an execution language that is used at a later phase namely the implementation phase. This language is needed for the technical analysts and programmers, because they specify the activities. These BPML also have some shortcomings. There are no specific guidelines for transforming a BPMN model to an BPEL structure, BPMN and BPEL aren't covering all the workflow patterns (the milestone phenomenon), UML has insufficient differentiation between data - and control flow, and so on. So the described BPML are necessary for the design and implementation phase of the business process modeling, but there are still some points that need improvement.

Chapter 6: Conclusion

This last chapter summarizes our findings during the thesis study. To create an overview of all these findings, the conclusion will start with answering the research sub question based on the previous chapters. These research sub question were defined in the introduction. Afterwards an answer will be given to the research question.

6.1 Answers to the research sub questions

This part of the conclusion summarizes the answers to the research sub question. As mentioned in the approach section in the introduction, this study is a literature study and the main source of information is reading scientific articles about the subject. For sub question 3 and 4 a tutorial of SAP Netweaver is followed to get a better understanding of these objects.

6.1.1 What can go wrong when implementing a SAP system?

An enterprise resource planning system is a very expensive system and the cost for implementing this system can be four times larger than the software itself. So the implementation of an ERP is an costly activity for the company. Failing to implement a successful ERP system can lead to bankruptcy.

Chapter 2 showed us that there are many pitfalls when an organization wants to implement an ERP system. This chapter also shows the critical success factors that can be used to avoid these pitfalls. The list of critical success factors doesn't always lead to success, but it can be a support for the organization when they want to implement an ERP system.

Like mentioned in the paragraph above, the critical success factors give the company a greater chance to successfully implement an ERP system, chapter 2 showed us the top ten of critical success factors with on the top management support. So a good implementation starts with good management support.

6.1.2 What services does BPM offer when implementing a SAP system?

Chapter 3 makes an overview of the benefits of business process modeling and the implementation phases of an ERP system. These benefits and implementation step will then be linked to the pitfalls of chapter 2 and that would lead to the services of BPM when an organization wants to implement a SAP system.

Chapter 3 showed that business process modeling can be a good support for an organization when they implement an ERP system. It can offer a lot of services that influence the outcome of the project positively like better ERP package selection, better communication,... . But there are also some downsides of using business process modeling (Complex, time consuming and error prone). If these disadvantages can be reduced, business process modeling has a bigger chance to lead the implementation of a SAP system to success.

6.1.3 What's the methodology for using BPM when implementing a SAP system ?

The previous section showed that business process modeling is complex, time consuming and error prone and that BPM has a bigger chance to lead the implementation to success, if these disadvantages could be restricted. These disadvantages can be restricted if there was a kind of framework, pattern and/or guideline for using BPM when implementing an ERP system.

Chapter 4 gives an overview of the methodology for using BPM when implementing a SAP system. The chapter used a framework for implementing an ERP system, to take a closer look at the different steps that have to be taken when implementing an ERP system. Business process modeling plays an important role in this framework. BPM starts with showing the current business processes in an AS-IS model, which makes it easier to understand the current situation. This AS-IS model is together with the strategic information the key component to find the business needs of the organization. These needs are documented in a TO-BE model. These two models lead to a better selection of the ERP package and as dicussed earlier this selection is a critical succes factor of the ERP implementation.

6.1.4 What Languages are used for BPM?

There are a lot of languages that can be used for business process modeling. But what is the purpose of all these languages, can these languages work side by side and are these easy understandable for both the business analysts and technical analysts.

Chapter 5 only explains the three most common languages, namely BPMN, UML and BPEL. The chapter shows that these BPML can work together to facilitate the business process modeling step. BPMN is used to represent the business process at a high level that can easily be understood by business analysts and technical analysts. UML is mostly used for software modeling and it can be used for business process modeling at a more detailed level. BPEL is an execution language that is used at a later phase namely the implementation phase. This language is needed for the technical analysts and programmers, because they specify the activities. The described BPML are all necessary for the design and implementation phase of the BPM, but chapter 5 shows that there are still some points that need improvement.

6.2 How useful is BPM when implementing a SAP system

Now that all sub questions are solved, a overview can be made to describe how useful BPM is when the organization implements an ERP system. The sub question gave pretty good results for the use of business process modeling. It revealed that business process modeling offers a lot of benefits for the company before and during the implementation. The system supports the selection of an ERP package and thus it helps making a better decision. Also the communication is improved when the company uses BPM. BPM also has some disadvantages (complex, time consuming and error prone), but these disadvantages can be restricted by using the methodology described in chapter 4. The last step described the different languages that are used for the implementation of the SAP system. These business process modeling languages can work together to facilitate business process modeling, but as described in the previous section, they also have some shortcomings.

This theoretical thesis revealed the many benefits of using BPM for the implementation of a SAP system. So at the theoretical level BPM is very useful for all companies, it increases the chance of a

successful implementation. BPM has some shortcomings, but these are negligible compared to the many benefits of business process modeling.

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Appendix: The software selection questionnaire

SOFTWARE PACKAGE SELECTION QUESTIONNAIRE

SECTION I

In the following questions we ask you to describe the general characteristics of your company and its Informational processing environment

1. What is your companies line of business (e.g electronics wholesaler)
2. Please indicate the number of employees in your company:

___ Under 50	___ 200 - 300
___ 50 - 100	___ 300 - 400
___ 100 - 200	___ 400 - 500
3. Please indicate your firms annual sales:

___ Under \$2 Million	___ \$6 - \$8 Million
___ \$2- \$4 Million	___ \$8 - \$10 Million
___ \$4 - \$6 Million	___ Over \$10 Million
4. What is your job title? _____
5. How long have turn-key software applications been used in your company?

Please rate your level of agreement with this following statement that describe business and information system planning in your company. (Use the following scale circle your response.)

- | | | | | | |
|--|-------|-------------------|---------|----------------------|----------|
| | 1 | 2 | 3 | 4 | 5 |
| | Agree | Somewhat
Agree | Neutral | Somewhat
Disagree | Disagree |
6. Well-defined business objectives exist for the total business and each major function. 1 2 3 4 5
 7. Management is attuned to the manner in which future business practices may affect informational requirements; eg growth. 1 2 3 4 5
 8. There is a high degree of structure in your organization. 1 2 3 4 5
 9. The kind of information you need for business planning is well-defined. 1 2 3 4 5
 10. Most operational procedures in sales/marketing are highly structured. 1 2 3 4 5
 11. Most operational procedures in production are highly structured. 1 2 3 4 5
 12. Most operational procedures in administration are highly structured. 1 2 3 4 5

13. Most operational procedures in sales/marketing are efficient. 1 2 3 4 5
 14. Most operational procedures in production are efficient. 1 2 3 4 5
 15. Most operational procedures in administration are efficient. 1 2 3 4 5
- Now consider the circumstances under which software is acquired in your company.
16. Your firm has formal procedures for selection of software. 1 2 3 4 5
 17. There are qualified personnel in your organization to implement new software packages. 1 2 3 4 5
 18. You need outside support to implement software packages. 1 2 3 4 5
 19. People in your organization are likely to be supportive of adopting new technology for information processing. 1 2 3 4 5

SECTION II

Please rank the Importance you attach to the following characteristics of software when you purchase it. Attach a 1 to the most important, 2 to the second most important and so on

The organization's motives for implementing new software

20. ___ ability to achieve cost savings by its use
 21. ___ ability to generate new information
 22. ___ reductions in personnel that can be achieved
 23. ___ improvements in customer service that can be achieved
 24. ___ improvements in operational procedures that can be achieved
 25. ___ better information for managerial control
 26. ___ better information for strategic planning
 27. ___ improvements in competitive position
- Please rank the importance of the following software features in making your decision to purchase. Attach a 1 to the most important 2 to the second most important and so on.
28. ___ Flexibility
 29. ___ Expandability
 30. ___ Integrability with existing system(s)

Please rate your level of agreement with the following statements about software purchases. (Use the following scale circle your response.)

	1	2	3	4	5
	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree
31. You determine specifically who will use this software before it is purchased.				1 2 3 4 5	
32. Specific estimates of the size of databases are produced before the software is purchased.				1 2 3 4 5	
33. Specific estimates of the volume of data activity are produced before the software is purchased.				1 2 3 4 5	
34. Specific estimates of the volume of data entry is determined before the software purchased.				1 2 3 4 5	
35. A short list of software packages available on the market that may fit your needs is developed.				1 2 3 4 5	
36. Multiple vendors with the same type of software are considered.				1 2 3 4 5	
37. The data can be easily converted for use with other software packages.				1 2 3 4 5	

Documentation

38. Documentation for users is easily understood by them.				1 2 3 4 5	
39. Software is easy to install from the documentation.				1 2 3 4 5	
40. The package is easy to operate from the documentation.				1 2 3 4 5	
41. The documentation for users provides adequate resolution of error conditions.				1 2 3 4 5	
42. The vendor updates the documentation regularly.				1 2 3 4 5	

Modifications

43. Modifications to computer programs can be performed by your personnel to adapt the software to fit the specific needs of your company.				1 2 3 4 5	
44. Source code is available for most applications.				1 2 3 4 5	

Cost

Please estimate the percentage of total cost allotted to the following areas:
(Totals should sum to 100%)

45. Purchase	_____ %
46. Implementation	_____ %
47. Training	_____ %
48. On-going Maintenance	_____ %
49. TOTAL	_____ %
50. Was this cost distribution appropriate?	Yes No

If you answered No in the previous question what would you consider a more appropriate distribution of costs to be?

51. Purchase	_____ %
52. Implementation	_____ %
53. Training	_____ %
54. On-going Maintenance	_____ %
55. TOTAL	_____ %
56. Would it be more cost effective to change organizational procedures to conform to the requirements of the software rather than vice versa?	Yes No

SECTION III

The next set of questions deals with criteria your company employs in selecting a software vendor. Please indicate whether you agree or disagree with the following statements. (Use the following scale circle your response.)

	1	2	3	4	5
	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree
57. Vendor reputation in providing support even when some product lines are discontinued is important.				1 2 3 4 5	
58. There are many installations with the particular software package that this vendor supports.				1 2 3 4 5	
59. You talk with personnel at other firms where the vendors product is installed BEFORE a similar product is installed in your company.				1 2 3 4 5	

60. You talk with personnel at other firms where the vendors product is installed AFTER a similar product is installed in your company. 1 2 3 4 5

61. It is clearly identified in the software purchase contract exactly what the vendor is responsible for. 1 2 3 4 5

In the next set of questions about services provided please rate the importance of the characteristic and whether it is provided by the vendor. (Use the following scale circle one response for each.)

Importance of	1	2	3
	Very Important	Average Importance	Not Important
Provision by vendor	1	2	
	Provided	Not Provided	

<u>Characteristic of Vendor services</u>	<u>Importance of</u>	<u>Extent to which vendor met the need</u>
Customer toll-free hot line for emergency support.	Q62 1 2 3	Q68 1 2
Guarantee of response time for resolutions of problems.	Q63 1 2 3	Q69 1 2
Training/technical assistance to custom-fit individual needs.	Q64 1 2 3	Q70 1 2
Modification of software to meet the needs of individual end-users.	Q65 1 2 3	Q71 1 2
Provision of a list of known problems with the software and a schedule for solving them.	Q66 1 2 3	Q72 1 2
A real data simulation run of the software can be performed on your system before accepting delivery.	Q67 1 2 3	Q73 1 2

SECTION IV

The next set of questions is intended to assess technical performance and user satisfaction with software. Please rate your level of agreement with the following statements. (Use the following scale circle your response.)

1	2	3	4	5
Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree

After the original break-in period please consider the following statements about software performance.

74. The software's affect on your system's response time is very close to what you had anticipated. 1 2 3 4 5

75. The software's affect on your system's response is worse than what you had anticipated. 1 2 3 4 5

76. When dealing with large volumes of data did you experience significant degradation in response time? 1 2 3 4 5

Please consider an area of your business where you have recently implemented a software package name that area and answer the following questions.

77. Business area of turn-key software package implementation

Is this software providing your users with:

- | | |
|---|-----------|
| 78. - complete data? | 1 2 3 4 5 |
| 79. - accurate data? | 1 2 3 4 5 |
| 80. - precise data? | 1 2 3 4 5 |
| 81. - understandable output? | 1 2 3 4 5 |
| 82. - timely output? | 1 2 3 4 5 |
| 83. - relevant output? | 1 2 3 4 5 |
| 84. - meaningful output? | 1 2 3 4 5 |
| 85. - security of data? | 1 2 3 4 5 |
| 86. - error recovery? | 1 2 3 4 5 |
| 87. - convenient access of information? | 1 2 3 4 5 |
| 88. - user-friendly operation? | 1 2 3 4 5 |

-- THANK YOU --

Auteursrechtelijke overeenkomst

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