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MASTER

E-business maturity model "Measuring the way to adulthood"

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E-business Maturity Model
"Measuring the way to adulthood"

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"The whole of science is nothing more than a refinement of everyday thinking."

Albert Einstein

Management summary

This study focuses on the measurement of e-business maturity of an organization. Many studies are performed to measure the maturity of an organization. However, there has never been a study before that focuses on the measurement of e-business maturity.

In order to design an e-business maturity model, first a literature review is conducted. Besides a literature review on the subject of e-business in the broadest sense of the subject, there is also a literature review conducted on the subject of maturity models in general. Because scientific literature does not agree on the definition of e-business the following definition is determined after a quick literature scan:

> *"E-business is conducting inter-organizational core business activities with integrated use of information technology for communicating and processing information"*

Although e-business is a fairly new phenomenon, there is a lot of literature about how to conduct e-business. From this literature three important aspects come forward, which are cooperation, change and strategy. Because e-business is about inter-organizational processes, cooperation is an important issue for the organizations that are conducting e-business. Working together with customers and suppliers to maximize the benefits of doing e-business is of vital importance to make it a success. And when an organization decides to implement e-business a lot of changes have to take place within the company. Employees will have to change their way of working, because the workflows that they are used to will change. Finally, to make sure e-business will have a sustainable place within the organization there should be formed a strategy and preferably this strategy should be incorporated into the general strategy of the organization.
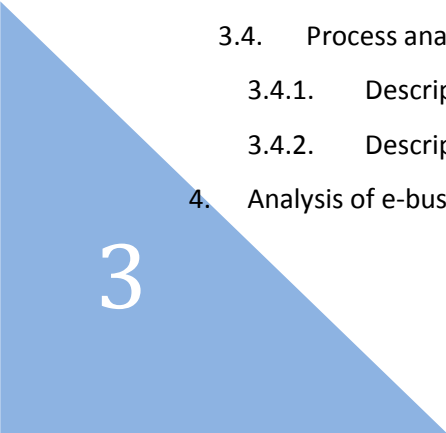
Maturity model is other fields of business and on other subjects can be found anywhere. Besides the maturity models that are derived or inspired by the Capability Maturity Model, there are also a lot of other maturity models that all have their own approach in assessing the maturity of an organization. In this study several maturity models are reviewed and together with the findings from the literature review on e-business it forms the basis for the design of an e-business maturity model.
The e-business maturity model is tested on a case study performed at De Lage Landen International B.V.. In this thesis the history, strategy and organizational structure of De Lage Landen is analyzed. This analysis is also used to get additional inspiration for the design of the e-business maturity model. The BOAT model of (Grefen, 2007) is used to analyze the e-business situation at De Lage Landen, which is specifically focused on the lease request process at De Lage Landen.

The e-business maturity model has 4 maturity levels, ranging from newbie to expert. Where obviously newbie is the lowest level, which means that e-business at that level is still very basic and the organization has not adopted its way of working to conducting e-business. The expert level 4 means that the organization under assessment fully embraced all facets of e-business. The assessment of an organization is divided into three aspect groups, respectively inter-organizational, intra-organizational and technological aspects. All three aspects are divided in several evaluation criteria, which are all evaluated on a scale of 1 to 4 only allowing integers.

The maturity level of De Lage Landen is assessed at level 2 and at the end of the thesis some recommendations are given. To improve the maturity level form level 2 to level 3, De Lage Landen should incorporate their IT strategy into the company's strategy and the performance gains should be addressed to improve the efficiency and effectiveness.

Table of content

4

1. Introduction

The subject of this master thesis is a model to assess the maturity of an organization with respect to their e-business activities. This research has a supporting role to the CoProFind project which is performed at and in cooperation with De Lage Landen. The aim of the CoProFind project is to elaborate on business models, process models and a corporate e-business architecture that can be used to support highly dynamic and complex financial lease services. This master thesis is focused on the analysis of the current processes and IT landscape of De Lage Landen and a scientific literature research in the field of e-business, e-business management and maturity models from other fields of business, which will result in an e-business maturity model. This model will enable organizations to assess their maturity on e-business activities that support the core business activities. This chapter will start with a discussion on the problem context, followed by a description of the research plan of this thesis. Finally the structure of the thesis is explained.

1.1. Problem context

In Business-to-Business relations, companies communicate and trade with numerous partners (clients, suppliers, intermediaries etc.). With the introduction of internet and email the possibilities of companies to communicate and trade with their partners grew enormously. Companies are no longer limited to physical visits, phone calls, faxes and letters. Although these forms of communication are still often used companies have the possibility to use a large set of electronic means to communicate with (potential) partners.

There is a wide variety of electronic means that enable communication with partners, which all serve a different goal. In this thesis the emphasize lies on e-business applications that are used to enable inter-organizational activities in a dynamic setting. Companies started with selling and buying online around 1996 (Earl, M.J., 2000) when it was predominantly used in the B2C market. However, in the last decade companies discovered the many opportunities conducting e-business had in the B2B market. Although a lot scientific material is written on e-business, companies still struggle how to incorporate e-business into their existing business processes. Using e-business affects their own processes and forces them to take the processes of the companies where they do e-business with into account as well. (Ash and Burn, 2003) discuss in their paper the implication introducing e-business has on the ERP system of a company. They conclude that integrating e-business into an ERP enabled organization is more than focusing on technical implications; also the social dimension plays a role in these projects.

Although research has been done about managing e-business and many other aspects of e-business, it is still difficult for companies to get a clear image on how well they are handling e-business and what opportunities they over look. However, for many other fields like project management, software development and many more, there are models to assess the maturity of an organization concerning the subject on hand. These so called maturity models enable companies to assess their current position in how they deal with for example project management and where they want to be in the future. (Demir and Kocabas, 2010) discuss the Project Management Maturity Model (PMMM) for educational organizations, based on the PMMM of (Wysocki, 2004), which describes 5 levels of maturity of project management and the way an organization can go from one level to another. Although maturity models describe several maturity levels it does not mean that the highest level should always be the goal for a company. The optimal level for an organization is the level that enable the organization to fulfill its strategic goals in the most effective and efficient way (Demir and Kocabas, 2010), this is not always the highest level described in a maturity model. Later in this thesis the subject of maturity models is revisited and analyzed in more detail.

For e-business such a maturity model does not yet exist, which makes it hard for companies to assess their maturity concerning e-business. With an e-business maturity model companies will be able to know how mature they are in using and managing e-business as well as decide where they want to be in the future. (Earl, M.J., 2000) presents a stage model for e-business, but this does not describes how companies deal with e-business but rather how a business evolves from introducing a company website to being ready for the new economy. The new economy being today's economy with all the information technology that is used for managing your business processes.

De Lage Landen, a global financial service provider, adopted e-business within their day-to-day business activities. To enhance the cooperation with their partners and to maximize the margins and profitability of both, De Lage Landen is using a variety of e-business applications. Currently De Lage Landen is in the middle of a large scale project to redesign their IT landscape and business processes, which also includes the e-business activities they deploy.

The problem statement that can be derived from the discussed problem context is translated to:

> "An e-business maturity model is not yet defined in scientific literature"

1.2. Problem approach

In order to tackle the problem statement five research questions are presented below. The research questions follow from the problem context described above. The research questions make sure that the goals of the thesis are clear. From the research questions presented below the problem approach can be determined.

1. What is the state of the art knowledge of e-business in the broadest sense of the subject?

2. What is a maturity model and are there any examples in other fields of business?

3. How can the maturity of e-business activities of an organization be measured using a maturity model?

4. What is the maturity level of De Lage Landen using the designed e-business maturity model?

5. How well does the developed e-business maturity model perform?

To answer the research questions that are presented above a research plan is followed. The research plan is loosely based on the regulative cycle by Van Strien (Van Aken, 2003). The regulative cycle is a method for performing an improvement project and has three main phases: orientation, research & design and finally introduction. Adapting the regulative cycle leads to the research plan presented below.

Problem approach	Description	Research goal
Analysis	Defining the problem context (chapter 1) Setting research goals (chapter 1) Research based on scientific literature (chapter 2) - E-business - E-business management - Maturity models Analysis of the organization context at De Lage Landen(chapter 3 & 4) Analysis of the business processes and e-business at De Lage Landen(chapter 3 & 4)	The scientific literature review will answer research question 1 and 2. The analysis of the organizational context and the processes at De Lage Landen will help answering research question 4.
Design	Design of the E-business maturity model (chapter 5)	The maturity model that will be designed, will answer research question 3
Implementation	Projecting the E-business maturity model on the situation De Lage Landen (chapter 6) Recommendations (chapter 6)	The projection of the e-business maturity model will answer research question 4
Conclusions	Drawing conclusion on the research performed (chapter 7) Evaluate the results (chapter 7)	The conclusion on the designed e-business maturity model will answer research question 5

Table 1: Research plan

1.3. Thesis structure

In the next chapter a literature research is presented, which has three different focus points. First of all literature is reviewed to come to an unambiguous definition of e-business. This definition of e-business together with the problem context gives direction to the literature review on e-business in organizations and maturity models, which is presented in the remainder of chapter 2. In the following two chapters an analysis of De Lage Landen is presented. This analysis is divided in five parts, respectively the history, strategy and organizational structure of De Lage Landen as well as a general process analysis. The fifth and final part is an analysis of e-business at De Lage Landen; this analysis is performed using the BOAT model (Grefen, 2007).

In chapter 5 the design of the e-business maturity model is presented, this design is inspired by the literature review and the analysis at De Lage Landen. The literature review on e-business is used to determine the content of the e-business maturity model, while the literature review on maturity models is used as an inspiration for the form of the e-business maturity model. In chapter 6 the e-business maturity model is applied to the case of De Lage Landen, which resulted in an e-business maturity level for De Lage Landen as well as some recommendations to improve their maturity. In the final chapter a reflection is given on the designed maturity model and the posted research questions are revisited and discussed. Finally some suggestions are given for further research.

2. Literature review

In this chapter a discussion is presented on e-business and the implications conducting e-business have on the management of a company's business processes. The goal of this chapter is to come to a definition for e-business that will be used throughout the thesis and to give an overview of the state of the art research on e-business management. The first part of the chapter gives a general overview of the different definitions of e-business and the terms that are closely related to e-business. The next part is a discussion on a range of definition of e-business. Finally a discussion is presented on e-business management and what implications conducting e-business has on the organization in which it is implemented.

2.1. Literature on e-business

In scientific and popular literature e-business is used in many different ways. Some speak of e-business as it is a synonym for a business that is conducting business electronically (Shaw, 2000) and (Barnes et al, 2003). Others refer to e-business as business conducted over the internet (Amit and Zott, 2001). (Philips and Wright, 2009) and (Krell and Gale, 2005) make a distinction between e-business and e-commerce, where e-commerce focuses on inter-organizational processes and e-business also incorporates the intra-organizational processes. In contrast (Grefen, 2007) makes another distinction between e-commerce and e-business. (Grefen, 2007) defines e-commerce as the explicit trading of objects and e-business may include trading but this does not have to be the case. The definitions are all limited to e-business and e-commerce, however, since the internet revolution took place in the early 1990's there are more terms introduced that are closely related. Such as i-commerce, online business, cyber-commerce and many others have been used in literature, to limit the discussion the next part will only address e-commerce and e-business and will lead to a definition of e-business which will used in the remainder of this thesis.

2.2. E-business in this thesis

As the above summary shows there is no consensus on what e-business means. For the end product of this thesis, the e-business maturity model, it is of great importance that the term e-business is clearly defined. To come to a clear definition of e-business some of the previous quoted articles are revisited and discussed.

(Shaw, 2000) and (Barnes et al, 2003) describe businesses that use ERP systems and the web for managing and structuring their business as an e-business. The systems that are used to communicate and trade with partners are either defined as e-commerce or electronic services that function over the web. For this thesis e-business is closer to what (Shaw, 2000) calls e-commerce and electronic services than a business that uses ERP, e-commerce and electronic services.

Nevertheless, (Shaw, 2000) and (Barnes et al, 2003) make a distinction between conducting business over the internet and using information technology to conduct wired business with partners. This distinction is not made by (Amit and Zott, 2001) they define conducting e-business as purely conducting e-business over the internet. They specify that conducting e-business is always including a website for the communication, while the use of applications installed at companies that use internet protocols to communicate are not incorporated into their definition.

(Philips and Wright, 2009) do include any form of electronically enhanced communication, interaction and trade to their definitions of e-business and e-commerce. However, they see e-commerce as inter-organizational processes with suppliers and customers. E-business is an extension of e-commerce according to (Philips and Wright, 2009) and also incorporates internal business processes. These internal business processes are for example accounting, marketing and operations.

However, IT supported internal business processes are not regarded e-business in this thesis, because these processes are part of the back office activities of an organization (Grefen, 2007). Nevertheless, the back office business processes can be influenced by the implementation of e-business within an organization.

To define the boundaries of e-business for this thesis the definition of (Grefen, 2007) provides a useful insight. (Grefen, 2007) defines e-business as conducting inter-organizational core business activities that are enabled by the use of information technology. Neither the business activities that are supported by information technology are not considered e-business nor the business activities that are not directly related to the reason why an organization exists. This narrows down the business processes that are considered e-business according to (Grefen, 2007). According to (Chatterjee and Ravichandran, 2004) the business processes that are enabled or supported by information technology both qualify for e-business, however, they do narrow it down to core business processes.

From the discussion above can be concluded that there is no consensus of what is considered to be e-business. The definition of e-business used for the remainder of this thesis is a combination of the definitions discussed above, with the definition of (Grefen, 2007) as the main inspiration. First of all e-business will not be limited to trading on the internet with a website as front-end. E-business can either have a website or a locally installed application as front-end. Secondly e-business is more than just the communication of information, it should also process information (Grefen, 2007). If information is just communicated or processed it is not considered e-business, it must be able to do both. The third criterion is that e-business is used for core business processes between organizations, so intra-organizational processes that are enhanced by information technology are not considered e-business. Finally the core business processes can be either supported or enabled by information technology, business process that are done more efficient or effective by the use of information technology and still fit in the first three criteria are also called e-business. These 4 criteria lead to the following definition of e-business which will be used in the remainder of this thesis.

> *"E-business is conducting inter-organizational core business activities with integrated use of information technology for communicating and processing information"*

2.3. E-business in organizations

Organizations that conduct business in the "traditional" way have a large amount of literature to gain knowledge from about managing their organization. Many articles and books are written on how to manage small, medium and large companies. Because software and for example ERP systems are around much longer than e-business there is also a lot written on how to manage software and information technology in an organization. Scientific research on the impact of e-business on managing an organization is still fairly limited. However, the benefits of e-business are recognized broadly. Introducing e-business will for example improve responsiveness, customer service and efficiency, and this will eventually lead to cost savings.

E-business, as any information technology supported or enabled business process, depends on systems which need to be managed such as networks, computer nodes and distributed software applications (Ray and Lewis, 2008). However, managing e-business includes more than managing systems, because it is about inter-organizational processes there is also an impact on organizational interactions. (Guha et al, 1997) put forward 3 major challenges in successfully carrying out an e-business project. The three challenges are: the change environment, the management of business process change and the outcome and performance gains. The short discussion above shows that using e-business in an organization puts forward new challenges to the management. To structure

the elaborate discussion on e-business in organizations three important aspects are addressed. First of all the change aspect, many scholars agree that introducing e-business demands managing change within an organization due to changing workflows and business processes (Ash and Burn, 2003), (Krell and Gale, 2005), (Phillips and Wright, 2009), (Barnes et al, 2003) and (Ray and Lewis, 2008). The second aspect to be addressed below is the cooperative aspect, this follows from the definition of e-business posted in chapter 2.2 of this thesis. Because e-business is about inter-organizational business activities it is important to consider the cooperation with the business partners involved. Finally the strategy aspect is discussed; as the implementation of e-business incorporates changing business processes and new IT systems, organizations need to re-think their IT strategy and corporate strategy as a whole.

2.3.1. Change aspect

Although change management is not a new subject in the management field it is important to take into account when an organization decides to implement e-business. (Ash and Burn, 2003) who discuss the managerial implications of introducing e-business in an ERP enabled organization, state that introducing e-business in such an organization is strongly linked to change management. Therefore, they emphasize on the attention for the learning processes, organizational culture and technology infrastructure as well as people and systems thinking. The implementation of e-business can be compared with the implementation of an ERP system. When an ERP system is implemented business processes change and the work situation of employees change this also applies for implementing e-business. (Guha et al., 1997) present a framework for business process change management which is adapted by (Ash and Burn, 2003) to an e-business change management framework (Figure 1)
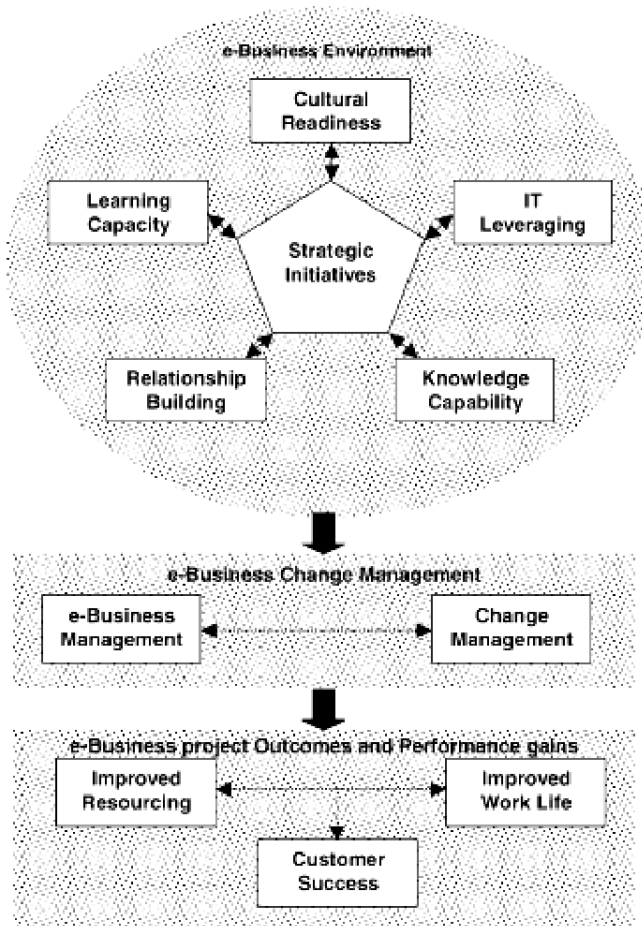

Figure 1: e-business change management framework (Ash and Burn, 2003)

This framework is used by (Ash and Burn, 2003) to examine six cases of e-business implementation projects. The results of the research shows that if the e-business environment and the e-business change management area presented in Figure 1 show high measurements, the e-business project outcomes and performance gains show good results too. This shows that paying attention to change management will increase the change of successfully implementing e-business. (Krell and Gale, 2005) present a model for e-business migration and conclude that e-business migration requires technology, business process, organizational and strategy change. This supports the idea of (Ash and Burn, 2003) that managing change is an important issue when e-business is implemented. On the other hand (Ash and Burn, 2003) acknowledge the inter-organizational processes in contrast to (Krell and Gale, 2005) who see e-business as an intra-organizational change. Since the definition for e-business determined in this thesis include the criteria that e-business is about inter-organizational processes, the next part addresses the managerial implications that follow from dealing with inter-organizational processes. Finally (Phillips and Wright, 2009) also agree that the social dimension of change management is important for the success of implementing e-business.

2.3.2. Cooperative aspect

Inter-organizational core business activities imply that the processes concerning e-business affect at least 2 organizations. Because e-business solutions cross organizational boundaries several organizations should cooperate in managing the e-business solutions successfully. In a B2B context both partnering organizations need to work together and thus need to overcome the differences of their requirements concerning the intra-organizational systems. This means that human and organizational cooperation is complicated with network and systems management (Ray and Lewis, 2008). To clarify the need for cooperative management in a B2B or B2C context (Ray and Lewis, 2008) present the following simplified picture to show the parties in an e-business supply chain (Figure 2).
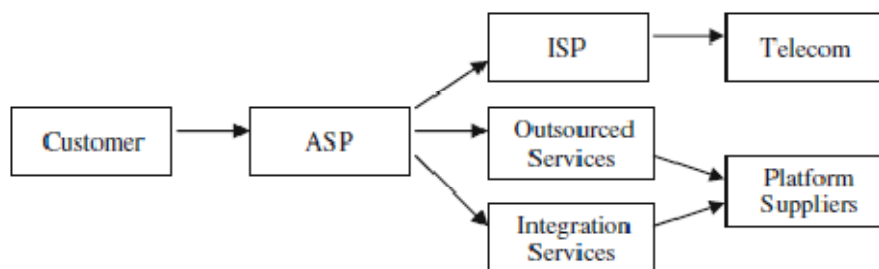
Figure 2: e-business management supply chain (Ray and Lewis, 2008)

(Ray and Lewis, 2008) propose a variation of scenario analysis on the overall cooperative system to discover patterns, which contribute to management solutions with respect to managing e-business. (Van der Aalst, 2002) and (Segev et al., 2003) also recognize the need for cooperation for managing e-business. The solution that is put forward by (Van der Aalst, 2002) is to design inter-organizational workflows. These workflows have as goal to support the cooperation between business partners, but to preserve the autonomy of the partnering organizations. With the support of workflow management systems, which provide tools for monitoring, modeling and enactment of business processes, the inter-organizational workflows could be managed in a more efficient way (Van der Aalst, 2002). (Segev et al., 2003) discuss the strategic, managerial, technical and infrastructural impact of e-business process interleaving, as they call it. The impact of e-business process interleaving on all four of these areas require a cooperative view on the situation. In addition (Segev et al., 2003) discuss four technologies, which include inter-organizational workflow management, web-services, integrated catalog management and active collaboration, to enable e-business process interleaving. The three discussed papers show that managing cooperation can have different approaches, but that it is important when an organization decides to use e-business.

2.3.3. Strategy aspect

(Krell and Gale, 2005) confirm that implementing e-business cause changes within the organization, because they see e-business as an intra-organizational issue they do not pay attention to the cooperative aspect with other companies. However, they do identify the need for strategic changes of an organization. (Krell and Gale, 2005) describe four stages of the migration to e-business. Stage one is mainly technology driven and does not take the current systems of an organization into account. Stage two does take the current systems of an organization into account, but the implementation of e-business was seen as an add-on to the existing systems. Stage three adds the strategy aspect to the focus of e-business implementation, but this was still creating problems with respect to the fit of the new processes to the existing processes and organizational structure. The fourth stage for implementing e-business incorporates process and strategic changes into the spectrum, which results in an e-business migration model presented in Figure 3 (Krell and Gale, 2005).
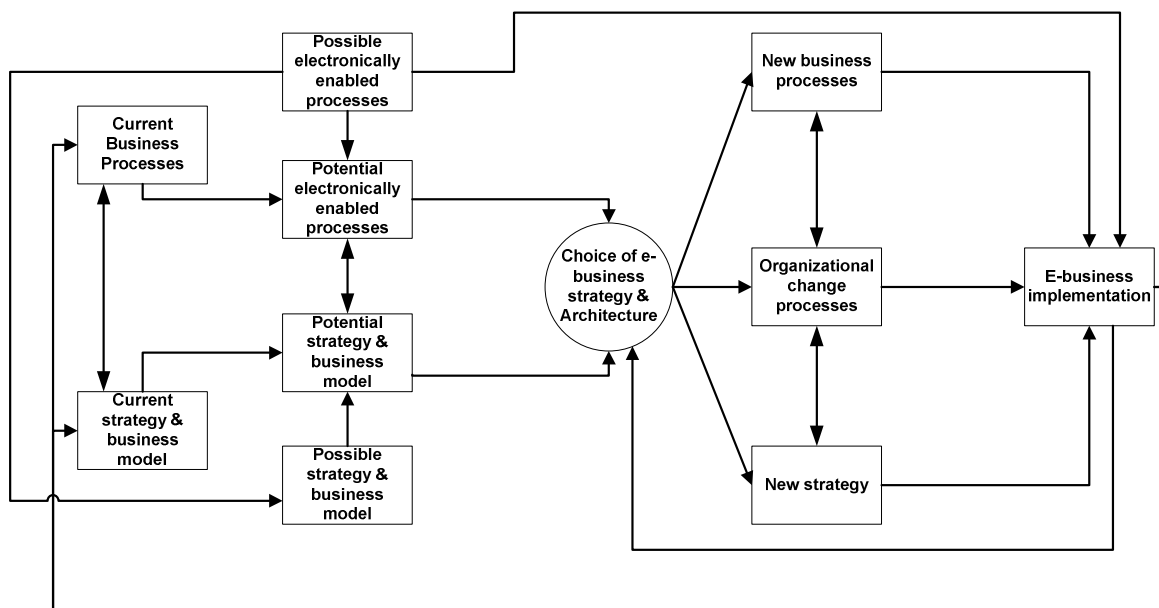
Figure 3: e-business migration model (Krell and Gale, 2005)

(Barnes et al, 2003) in their turn see the changing world economy as a driving force to extend the "traditional" operations strategy with information systems strategy. Because the world economy is changing in a global information economy it is important for organizations and academics to pay more attention to the role of information systems strategy to the corporate strategy as a whole. (Borges et al., 2009) support the idea that a strategic plan for IT improves the organizations e-business capabilities and that the IT strategy should support the corporate strategy as a whole. In addition they propose that the IT strategy should be categorized in inter-organizational, market, operational support and decision support systems. (Borges et al., 2009) also put forward a number of success factors for e-business where relationship with partners and interaction and customization seamlessly support the above discussed cooperative aspect.

2.4.Maturity models

In addition to the literature research about e-business presented in the previous parts, this part will discuss the scientific literature about maturity models. Although there is no scientific literature that describes an e-business maturity model it is interesting to address the existing maturity models in other fields of business. The goal of this part of the literature research is to explore the differences between existing models and learn lessons from it which can contribute to the development of the e-business maturity model. The next part will first shortly describe the development of maturity models and some outstanding examples. After that the existing maturity models are described, first 2 models are addressed that seem to be close to an e-business maturity model. Secondly several models are discussed that are inspired on the Capability Maturity Model (describes below). Finally, three e-government maturity models are discussed, because this is an area that is considered to be close to e-business. Instead of a B2B relation it describes a situation of G2C.

2.4.1. The development of maturity models

As the problem statement in chapter 1 of this thesis states there is not yet an e-business maturity model, nevertheless, maturity models are not a new phenomenon. The first model in the field of information technology that has some characteristics of a maturity model is from (Nolan, 1973). (Nolan, 1973) describes a stage model that was inspired by stage models from the 19th century, for example the stage model of Karl Marx. (Nolan, 1973) describes four stage levels for "managing the computer". To determine in which stage an organization is generic tasks are describes, which are broken down into controlling, organizing and planning tasks. Analysis of how an organization has managed these tasks leads to a certain score which then is translated to a maturity level for the organization. In the publication of (Nolan, 1973) is also described which characteristics are common for stages model. These characteristics were defined by (Kuznets, 1965); he stated the following about stage models:

1 The characteristics of each stage should be distinct and empirically testable
2 the analytical relationship of any stage and its predecessor and successor should be well defined.

Another landmark in the development of maturity models is the Capability Maturity Model (Humphrey, 1987), this model is a service mark registered with the United States Patent and Trademark Company. The Carnegie Melon university service marked this model in 1989. This model is inspired by the stage model of (Nolan, 1973). The Capability Maturity Model is a maturity model for the software development processes and has defined 5 maturity levels, these levels are: initial, repeatable, defined, managed and finally optimized. For every maturity level a description is given and steps that should be taken to move to the next level. After (Humphrey, 1987) there have been several improvements to CMM which have led to version 1.1 in 1993. This newer version still describes the same maturity levels; however, key process areas were added as well as common features and key practices. These three additions together describe in detail how a higher level of maturity can be reached. Also the way the CMM should be used is described in greater detail in version 1.1. CMM is an inspiring maturity model for many academics; in chapter 2.4.3 a few of these CMM inspired maturity models are discussed.

2.4.2. Maturity models closely linked to e-business

A very interesting stage model, as they call it, on first glance is the e-commerce stage model of (Rao et al., 2003). In the beginning of this thesis was claimed that there is no e-business maturity model, however, an e-commerce stage model might not be far off. But as Figure 4 shows level 1 cannot qualify for e-business respecting the definition of this thesis given in chapter 2.
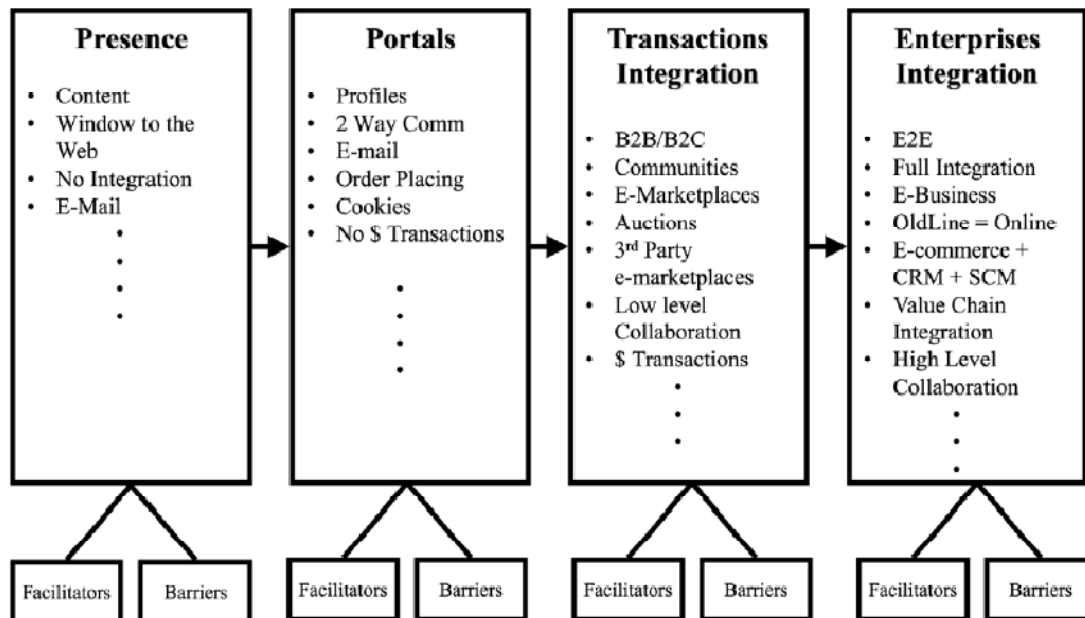
Figure 4: e-commerce stage model (Rao et al, 2003)

The quality of this stage model can be argued, because the description of the stage levels is rather brief. In addition the description of the stage levels are limited to the functionalities of the e-commerce present in an organization. However, the facilitators and barriers put forward interesting issues that will arise when the processes of an organization will be affected more when an organization progresses to a higher stage level. In the final stage managing outside organizational borders is addressed as well, which was also discussed in chapter 2.3.

(Plant et al., 2003), use a Balanced Scorecard (Kaplan and Norton, 1992) approach to support the management of e-business. Although they do not describe maturity levels, the approach they propose describes extensively what factors should be addressed to be successful in managing e-business. (Plant et al., 2003) propose in addition to the four perspectives, which are linked together through vision and strategy, four extra focus points which are all related to the customer perspective. They claim that the customer perspective is very important in an e-business situation, which corresponds to the findings in chapter 2.3. Nevertheless, the four additional focus points introduced should be carefully combined with the internal process perspective and the learning and growth perspective. (Plant et al., 2003) also stress that besides the added value for the customer, e-business implementation should also benefit to the company's bottom-line.

2.4.3. CMM inspired maturity models

The project management maturity model (PMMM) that is discussed by (Demir and Kocabas, 2010) is an example of a maturity model that uses the Capability Maturity Model as an inspiration. Besides the maturity levels that are adopted from the Capability Maturity Model (CMM), the PMMM also incorporates the other characteristics of the CMM, which are: key process areas, goals, common features and key practices.

(Berg et al., 2000) developed a quality maturity model for R&D, for the development of this model they also adopted the maturity levels of the CMM. However, the way the quality of R&D is assessed to finally come to a maturity level for the quality of R&D is different from the CMM. In Figure 5 the assessment method is depicted.
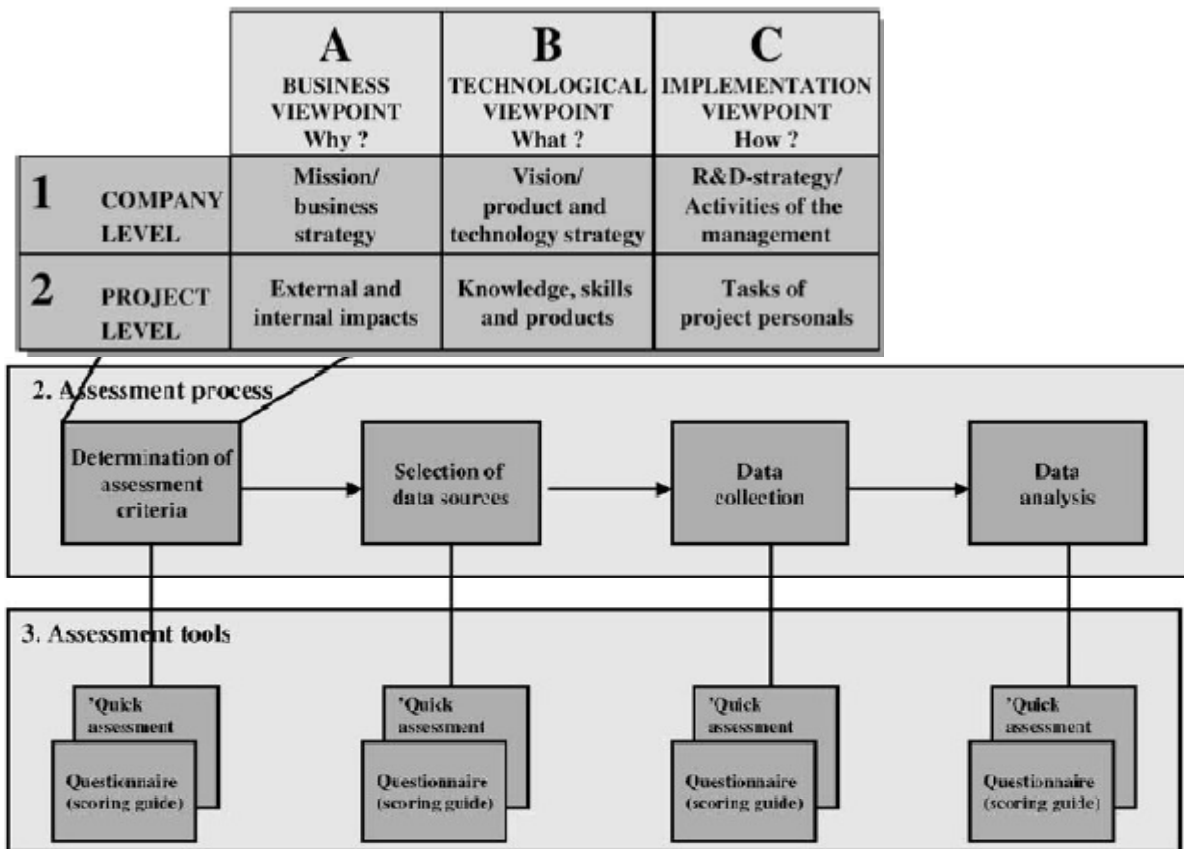
Figure 5: the assessment method of QMM for R&D (Berg et al., 2000)

(Berg et al., 2000) define six activities that need to be assessed, for all six activities assessment criteria are determined. When the criteria are determined the data sources are selected and then the data is collected and analyzed. The assessment tools that are used by (Berg et al., 2000) are a quick assessment and a questionnaire including a scoring guide. The quick assessment form contains 5 descriptions about the performance in each of the six assessment areas, employees choose the descriptions that they think fits best to that assessment area.

2.4.4. E-government maturity models

(Layne and Lee, 2001) developed a four stage maturity model for assessing e-government maturity. The maturity levels they describe are developed using a two dimensional space that both range respectively from sparse to complete and simple to complex. Figure 6 shows the maturity levels of (Layne and Lee, 2001).
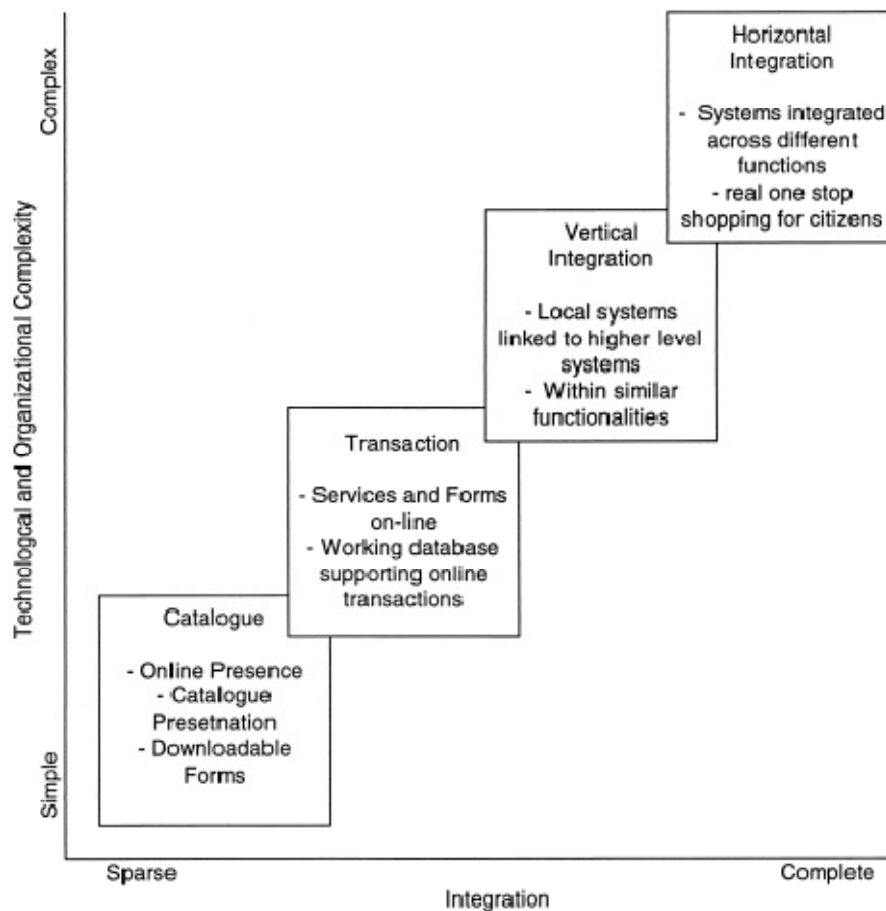
Figure 6: e-government maturity levels (Layne and Lee, 2001)

They describe each stage with a definition, functionalities and challenges. The definition and functionalities are generally described in Figure 6. The challenges they describe include technological and organizational challenges that come with the maturity level a government is in. In addition to the descriptions that are part of the maturity levels, they also address three issues that support citizen's demands. Universal access and citizen focus of government management are two of these issues that can be directly and exclusively linked to e-government maturity. However, the third, privacy and confidentiality are issues that are applicable for many "e-situations". When information of either organizations or natural persons is send over internet, it is always an issue whether this information is handled with care. This can also be translated into managing the trust relationship with a customer in a B2B or B2C relation. (Anderson and Henriksen, 2006) adapt the model of (Layne and Lee, 2001) in such a way it becomes a Public Sector Process Rebuilding maturity model. They change the focus of e-government from a technical integration issue to the front end of a government. In line with this change of focus they also propose to rather look at requirements pull than technology push (Grefen, 2007).

Another e-government maturity model by (Valdes et al., 2011) inspired the capability and maturity levels as well as the assessment mechanics on the classic CMM's. The stages of growth were inspired by models of e-government evolution and the areas that should be addressed within e-government project were inspired by governmental and holistic models. Combining all the information from the different models they investigated led to four leverage domain that in their turn are all broken down into several key domain areas. For all the key domain areas is described at what minimal capability level they should be to qualify for an organizational maturity level. This resulted in the table presented in table2.

Leverage domain	Key domain area	Organizational Maturity Levels				
		ML 1: initial	ML 2: developing	ML 3: defined	ML 4: managed	ML 5: optimizing
e-Government strategy	Vision, strategy and policy		2	3	4	5
	Enterprise architecture strategy				3	4
	IT management and organization		2	3	4	5
IT Governance	IT architecture			2	3	4
	Portfolio and risk management		2	3	4	5
	IT service delivery			2	3	4
	Assets utilization			2	3	4
Process management	Business process management			2	3	4
	Performance management			2	3	4
	Services to citizen and business		2	3	4	5
	Interoperability		2	3	4	5
	Compliance		2	3	4	5
	Quality and security assurance			3	3	4
Organization and people	Infrastructure and eGov tools		2	3	4	5
	Knowledge management				3	4
	Human capital		2	3	4	5
	Change management				3	4

Table 2: Organizational maturity in terms of the capability of priority key domain areas (Valdes et al., 2011)

Although the three maturity models described in this part are all concerning government-to-customer based relationships there are similarities with the business-to-business context. For example in the (Valdes et al., 2011) maturity model, the leverage domains can be translated to a B2B context. However, in a B2B context the inter-organizational relations and process have to be managed and the IT landscape of the involved businesses should be taken into account as well. This complicates the situation, but the e-government maturity models with the G2C context still give useful insights that can be used for the development of the e-business maturity model.

3. Organizational context

In this chapter the organizational context of De Lage Landen is presented. The goal of this chapter is to give a clear picture of De Lage Landen with respect to its history, strategy, organizational structure and processes. In the first part the history of De Lage Landen is shortly addressed. Then the strategy of De Lage Landen is presented. In the third part of this chapter the organizational structure of De Lage Landen is explained and finally, the general processes of De Lage Landen and Athlon Car Lease are explained.

3.1. De Lage Landen history

De Lage Landen (DLL) is leasing company founded in 1969 based in Eindhoven, the Netherlands. As a fully owned subsidiary of the Rabobank Group, DLL was founded to fulfill the growing demand for more sophisticated financial service focusing on the agricultural sector. Because the Rabobank is a merger of two banks founded by enterprising rural folk that had limited access to the capital market, it is not surprisingly that the start of DLL is based on a growing demand from the agricultural sector as this sector forms the basis of the Rabobank group. The operations in the agricultural sector grew and therefore a demand for financing these operations grew as well.

After a few years, in 1987, De Lage Landen is starting to expand their business to surrounding countries, such as Belgium, Luxembourg and Germany. From there De Lage Landen expanded to global company that provides a wide range of financial services for different industries in 35 countries spreading throughout Europe, North and South America, Asia and Australia. In 2009 De Lage Landen also started their first activities in Africa, more specific in South-Africa, so it is safe to say De Lage Landen is a truly global company offering abroad range of financial products.

Although De Lage Landen started in the agricultural sector, it is now also active in e.g. healthcare, office technology and construction & industrial sector. In 2006 De Lage Landen acquired Athlon, an international car leasing company that was active in 9 European countries. Besides the acquisition of Athlon Car Lease, De Lage Landen also became the competence centre of the Rabobank for consumer finance in the Dutch market. In addition to the consumer finance products De Lage Landen sells trough the local Rabobank offices it also started FREO.nl to serve the consumer directly through internet.

The core activities nowadays of De Lage Landen are Vendor Finance, Consumer Finance, Car Lease and Factoring. Although De Lage Landen also felt the effects of the global economic crisis especially in 2009, De Lage Landen has started the recovery in 2010. With a net profit of €201 million and a total credit portfolio of €25.2 billion in 2010 is still growing. In comparison the net profit in 2009 was €112 million and the total credit portfolio was €23.7 billion. In 2010 De Lage Landen employed more than 5000 people globally. For an overview of the figures of De Lage Landen from the last 5 years please refer to *appendix 1*.

3.2. De Lage Landen strategy

De Lage Landen emphasizes on partnering with their customers and potential customers. Although the reach of De Lage Landen is global and they will keep expanding globally, they will also try to keep the contact as personal and local as possible. With the partnering concept De Lage Landen helps their partners to increase their margins and profitability without undermining the growth of De Lage Landen's margins and profitability. Because De Lage Landen focuses on a compact set of industries and set up long-term partnerships with their customers in these industries, they gain experience and knowledge of these industries which helps them to be more than just a financing company. In *appendix 2* a complete overview is given of the mission, ambition, core values and competences of De Lage Landen.

Another important value for De Lage Landen is corporate social responsibility. The corporate social responsibility has taken a significant place in the organization. This corporate social responsibility program has 4 pillars: eco efficiency, community involvement, sustainable & innovative solutions and "our way of doing business". This beholds promoting "green car solutions", investing in local project and charities and working together with partners on sustainable solutions. For a more comprehensive description please refer to www.delagelanden.com.

3.3. Organizational structure

In this part the organizational structure of De Lage Landen is presented, Figure 7 shows a high level overview of the departments at De Lage Landen. The goal of this part is to give a general overview of the products and markets where De Lage Landen is active. Therefore, the description of the departments is limited to the commercial business units of vendor finance and the departments of financial & mobility solutions.
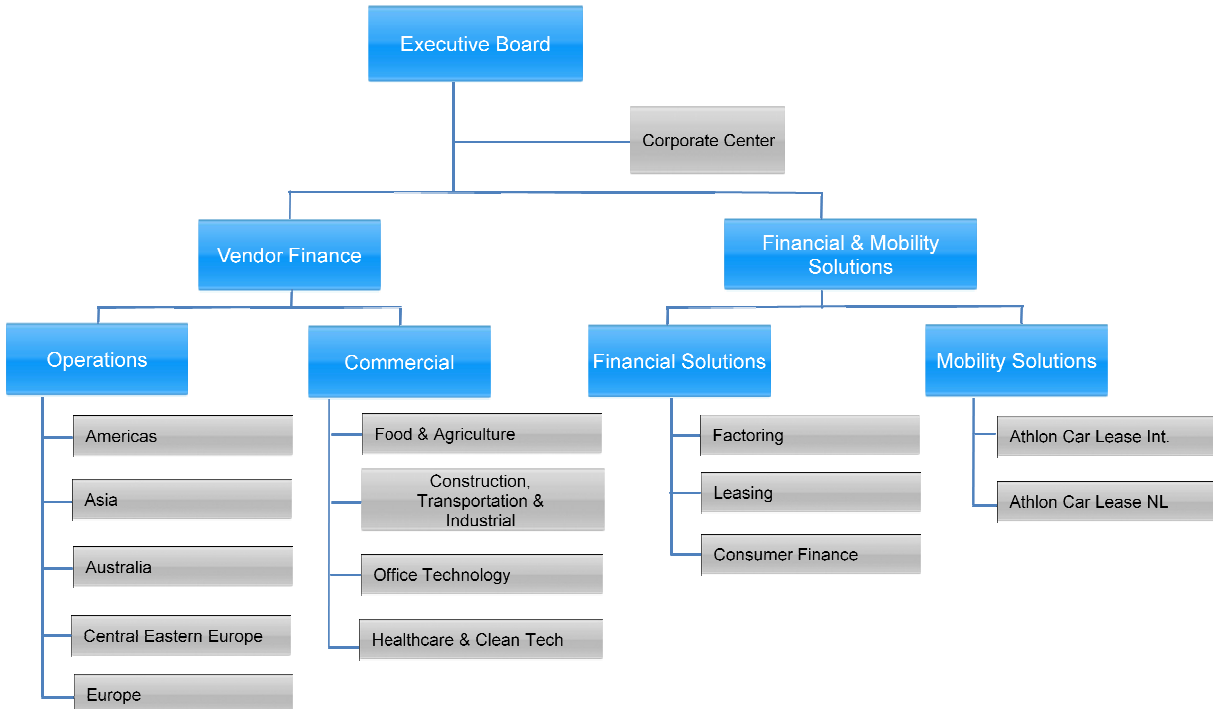
Figure 7: Organizational structure of De Lage Landen

3.3.1. Vendor finance

Vendor Finance is considered the core competency of De Lage Landen. When De Lage Landen started in 1969 the first business activities of the company was selling financial products and services to the food & agriculture sector. As described before this was a driven by the demand on that market and the fact that the Rabobank has a long history in the agricultural sector. Through partnering De Lage Landen tries to sell their leases to the end-consumers, the end-consumer will go to either a vendor or dealer to buy the equipment they are looking for. In case the end-consumer wants to buy the equipment, but does not have the cash on hand it can opt for a lease or a loan. However, De Lage Landen is providing the loan or lease, the contract the end-consumer signs at the dealer or vendor has the brand name of the vendor or dealer on it. In the next part a more detailed description is presented of the different business units of Vendor Finance.

3.3.1.1. Food & agriculture

The global business unit food & agriculture serves a market that is under a lot of pressure the past decades, therefore governments offer a lot of grants to ensure the local food production of the country or continent. These grants are vital for the farmers and agricultural businesses to survive in the global agricultural market these days. For De Lage Landen these grants are a positive fact which implies that the financial risk in this market is lower than the other markets where De Lage Landen is active. The products De Lage Landen offers through this global business unit are leases and loans, however, loans are the largest part of the products sold in this market. Due to the long experience of De Lage Landen in the food & agricultural market there is a lot of knowledge available within De Lage Landen about the market and products.

3.3.1.2. Healthcare

In the healthcare industry De Lage Landen is present in large variety of market sectors such as hospitals, laboratories, veterinaries. To serve these different market segments De Lage Landen does not only offer leasing equipment, but also software financing, insurances, commercial financing, asset management and much more. The healthcare market is a difficult market in some countries, because governments have strict rules regarding financing for the institutions in this market. Therefore it is sometimes hard for commercial companies to enter these markets. The products that are sold in these markets are mainly the financial lease construction.

3.3.1.3. Office technology

De Lage Landen is active on the office technology market for more than 35 years, using a range of different financing services such as operational and financial leases as well as inventory financing. However, also more customized financial solutions are offered like pay-per-use, government financing and access to global capital markets. The products that the partners offer range from copiers and office furniture to broadcast and video production equipment. A big partner of De Lage Landen in the Netherlands is Océ.

3.3.1.4. Construction, transportation and industrial

The construction, transportation & industrial business unit of De Lage Landen offers with their partners support for the entire equipment finance cycle. This means that commercial wholesale and floor plan offerings to retail lease options backed by asset management and remarketing support are part of the financial products and services of De Lage Landen. The construction, transportation & industrial market is very broad, however, De Lage Landen focuses on construction, material handling, machine tools and other industrial segments. In this market the operational leases are the largest part of the products sold. Together with the partners, who sell the leases of De Lage Landen to the end-customer, service contracts are also a focus of the sales activities.

3.3.2. Consumer finance & leasing

For consumer finance two channels are used which are the local Rabobank offices and FREO.nl. Through these channels consumptive credit, personal loans and operational and financial leases are sold. De Lage Landen also provides credit scoring for Robeco and Rabobank. FREO.nl offers an easy to use website to apply for a personal loan, consumptive credits and EcoLoans. Through the local Rabobank offices equipment, car and commercial-vehicle leasing is offered, as well as trade financing. In the United States De Lage Landen is a provider of equipment leasing outsourcing for banks.

3.3.3. Factoring

This part of De Lage Landen offers a range of on- and off balance working capital solutions to companies based in the Netherlands as well as some subsidiaries abroad. The main focus of De Lage Landen Factoring is small and mid size enterprises, but also some larger businesses are clients of De

Lage Landen. With the working capital solutions De Lage Landen makes it possible for companies to have more financial space for running their businesses.

3.3.4. Car leasing

Consumers who want to lease a car or commercial-vehicle for their own use can contact their local Rabobank office. For the leasing of fleets Athlon Car Lease is the place to be. Athlon Car Lease Nederland is market leader in the Netherlands with a fleet of 128.000 cars. The core values of Athlon Car Lease are quality, customer satisfaction and regional involved. The mission of Athlon Car Lease is "preserving mobility". Athlon Car Lease is a fully owned subsidiary of De Lage Landen. Besides car leases they also offers fleet management, rental cars from their own rental fleet, re-leasing and a range of green products. These green products are e.g. NS-business cards, durable mobility plans and green car leasing. Athlon offers different ways of leasing; the customer has choices concerning financing, management, lease term etc.

3.4. Process analysis

The goal of this part is to present an overview of the business processes of De Lage Landen and Athlon car lease. The focus of the described processes is on the front office processes. The back office processes that include for example invoicing, recovery and booking do not fulfill all criteria for e-business. They are not part of the core business processes of De Lage Landen. Consumer finance and factoring are also not included in this process analysis, because these two activities are relatively small within De Lage Landen. The general processes of Athlon car leasing will be addressed in this chapter, because they are the market leader in The Netherlands concerning car leasing. Besides that Athlon car lease has an extensive e-business package to serve their customers, which is interesting with respect to the subject of this thesis.

3.4.1. Description of the general process at De Lage Landen

De Lage Landen is currently in a process of changing their global processes. They started the Beacon project in cooperation with Oracle, with this project De Lage Landen is re-designing its IT landscape and set up a new high level architectural model for their future information systems. In chapter 2 is mentioned that implementing e-business affects business processes as well, when an IT landscape as a whole is re-designed it naturally also has effect on the business processes. The processes that are described in Figure 8 are based on the current state of the processes according to the global business process model.

Figure 8: the high level process of De Lage Landen

The process step "partner with customers" describes the process of acquiring contact with potential partners and trying to sell the products and services of De Lage Landen. In case of the Vendor Finance global business units the sales departments of these global business units set up a prospect list with potential partners which will be contacted. In case a company approaches De Lage Landen for information about the products and possible partnership, De Lage Landen will internally discuss the potential of this company and decides to continue with the lead or not. Depending on the size and other characteristics of the company, from the prospect list or proposal request, the appropriate representative of De Lage Landen continues with the case. De Lage Landen has several policies describing the characteristics of potential partners, based on these policies a standard process or a custom process is followed to set up a partnership. In these processes the legal and credit decision

department play a role to ensure the credibility and legal correctness of the potential partner. In this process the IT programs as well as the risk of the potential partner is evaluated to get a clear image of which steps should be taken to install the e-business application of De Lage Landen for entering lease contract requests details at the potential partner. When it finally comes to a partner agreement De Lage Landen ensures that the e-business application can fully function at the partner.

The "process lease quote" process step represents the process step receiving lease quote request and how these are processed and judged. This beholds checking all financial characteristics of the applicant of the quote. These checks consist of checking for existing leases, financial reports of the company and other financial and legal checks that influence the quote and credit decision that have to be made. From the quote that is returned to the applicant a new cycle of quoting can be started or the quote can be promoted to a lease proposition. The back office will follow up on the quotes that are submitted, to double check the properties of the quotes to ensure the quotes are still valid based on financial and legal grounds. After De Lage Landen is finished with reviewing the quote and sends the completed quote back to the customer, the quote can be rejected or accepted. When the quote is accepted a lease request can be filled out. In some cases a customer directly asks for a lease without first asking to receive a quotation.

3.4.2. Description of general process at Athlon Car Lease

The customers of Athlon Car Lease are organization of all sizes that want to lease a fleet of cars for their employees. To acquire new customers Athlon Car Lease is actively searching the market to approach potential customers. When a new customer is acquired a master contract is negotiated, this master contract contains information about services the customer requests and the price levels that apply to the customer. Such a master contract is only signed and approved after a thorough credit check and financial analysis of the new customer. After a master contract is signed, approved and booked the fleet manager gets access to Athlonline the e-business tool that Athlon Car Lease uses with its customers.

Athlonline can be used by the fleet manager to manage the whole fleet of the company, Athlonline also allows the drivers to search for lease cars which are available for them. The several modules that are available in Athlonline offers the fleet manager the possibility to manage his whole fleet online from quoting, ordering to re-use lease cars which contract was terminated early. Autofocus is a separate module for Athlonline for fleet managers to receive regular reports on gas usage, expiring contract and much more. In addition to Athlonline and Autofocus Athlon Car Lease also offers Athlon e-invoicing which enables the fleet managers to process the financial side of fleet management also online. All three applications are directly connected to Atlas the ERP system of Athlon Car Lease, so the information fleet managers and lease car drivers get is as up-to-date as Athlon can provide. Besides the leasing branch of Athlon Car Lease which is their core business, they also offer rental cars to businesses. When a customer requests a rental car by phone or email, the availability is checked and the transport of the car to the customer is planned. Rental cars are always delivered and picked up at the customer to keep the service on a high level.

When a lease car or rental car can no longer be rented or leased they are made ready for re-marketing. Athlon Car Lease can also offer the lease car to the driver when this is agreed in the lease contract. Otherwise Athlon Car Lease uses 4 different ways of re-marketing the ex-lease or ex-rental cars. After the value of the car is estimated by experts the car is offered for subscription for 2 days, interested people can take a look at the car and make an offer, if Athlon expect to get a higher price for the car through one of the other three channels they do not sell. The other three possibilities are auctioning the car, trade (car dealers buy a collection of ex-lease cars at a time) or the car is put on www.occasioncenter.nl. The latter option is mainly used for cars which have an interesting mileage or state.

4. Analysis of e-business support at De Lage Landen

In this chapter the e-business situation at De Lage Landen is analyzed. The goal of this chapter is to give an overview of e-business conducted at De Lage Landen. In the first part of the chapter a description is given of the e-business in general at De Lage Landen. In the second part of the chapter the BOAT model (Grefen, 2007) is used to analyze a specific example of e-business at De Lage Landen. BOAT is an abbreviation of business, organization, architecture and technology. The BOAT model is a framework to analyze the aspect dimension of e-business. The business level describes why a business conducts e-business, while the organizational level describes how a business is structure to achieve the goals set in the business level. The architectural level of the framework describes how automated systems support the organizations involved and finally, the technology level describes the information and communication technology that is needed to realize the architecture described in the architectural level. The BOAT framework can be seen as a stack or a wheel, a wheel model implies that a change in any of the four levels could cause a new business scenario. For a detailed description of the BOAT model please refer to (Grefen, 2007).

4.1. The e-business situation

De Lage Landen has several applications within their IT landscape that serve their e-business processes. With the start of the Beacon project, which is executed in cooperation with Oracle, De Lage Landen is making a big step in defragmenting their IT landscape that reaches over the whole organization all around the world. With the Beacon project De Lage Landen is not only re-designing the IT landscape, but also the business processes are taken into account. The project prescribes strict rules for architectural requirements and how changes that do not comply with the architectural requirements should be handled. The project also prescribes the flexibility, training, operations and performance requirements. Besides the requirements of the new architecture it also addresses change management issues and the styles of the interfaces in order to provide one look and feel to all employees of De Lage Landen as well as Rabobank employees.

In the current situation at De Lage Landen a lot of these issues are not organized to the standards the Beacon project prescribes. Business units do not use the same applications for tasks that show great similarity.

4.2. Applying the BOAT model at the DLL case

The focus of the BOAT analysis at De Lage Landen is the e-business conducted in the vendor finance lease process. As the criteria for e-business and the e-business definition explained in chapter 2 of this thesis prescribe processes that can be supported or enabled by e-business must be inter-organizational and core business processes at the organization under analysis. Selling leases in the vendor finance markets is the core competence of De Lage Landen. Therefore, the lease request process and the e-business application used there are the subject of analysis in this part. Because business unit do not all use the same applications, one specific application is chosen to analyze with the BOAT model. The application that will be analyzed is new application that will be used when the Beacon project is finished. This application is @oncefinance 2.0, which is used among other things to register lease request, make online credit decisions, generate documents and request termination quotes. The user interface for partners is called eCs. Although @oncefinance 2.0 is not fully deployed it serves the same goal as its predecessors extended with some additional features.

4.2.1. Business aspect

There are two important aspects in which e-business can be different from traditional business: *Reach* and *Richness.* The reach is about the range of the business environment, where the richness is about the frequency and intensity of the communication between the organizations involved in the inter-organizational processes.
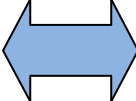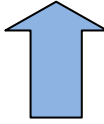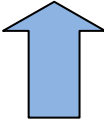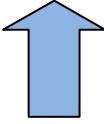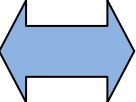
Reach level	Impact of e-business	Changes due to e-business implementation
Geographical	↔	One of the most important strategic goals of De Lage Landen is partnering and knowledge of local markets. De Lage Landen has offices in 35 countries to ensure knowledge of local markets. Although e-business could increase the geographical reach, the strategic goals of De Lage Landen, partnering and knowledge of local markets, forces De Lage Landen to be physically present in the markets were they operate. Therefore, the geographical reach did not increase by introducing e-business, because De Lage Landen still want an office in the countries they operate.
Temporal	↑	The temporal reach has increased, because partners are able to use eCs any time during the day. This makes it possible to enter a quote or lease request 24x7 and get direct response through eCs.
Modal	↑	The modal reach increased as well, because besides sending a quote or lease request via email or fax they now have the possibility to use a locally installed interface.
Richness level		**Changes due to e-business implementation**
Frequency	↑	The frequency of communication can be increased, because both parties do not have to take into account when the other party is available the frequency can be higher. Before De Lage Landen introduced e-business tools, sending an email or fax for requesting a quote or lease could be done at any time during the day, however, the response to these requests took more time.
Level of detail	↔	The level of detail did not change. The interface used by the partners offers the same possibilities as before.
Used media	↔	The used media did not change. Videos, photos or animations do not have any additional value for the application.

Table 3: changes in reach and richness

24

4.2.1.1.   Restructuring business collaborations

The implementation of the e-business solution did not cause for any disintermediation or re-intermediation. De Lage Landen was a financial service provider to their partners and still is. And whether are dealer or vendor is the partner is not influenced by the use of the e-business solution; the partnering decisions are still driven by strategic considerations.

4.2.1.2.   New business directions

De Lage Landen did incorporate new business forms, because they integrated bricks and clicks (Jelassi and Enders, 2005). The locally installed interface eCs allows for direct credit decisions, which was not possible before. Nevertheless, the "old" way of conducting business is still in place and can replace eCs at any given time. If all systems fail, at De Lage Landen and at the partner, De Lage Landen is still capable of performing credit checks and processing quote and lease requests. Because eCs allows partners to receive real-time credit decisions De Lage Landen is also able to offer true on-time and online capabilities.

4.2.2. Organizational aspect

In this part the lease request process is explained in detail after which this process is mapped to the organizational structure that supports this process. To enhance readability the process is divided into three parts.
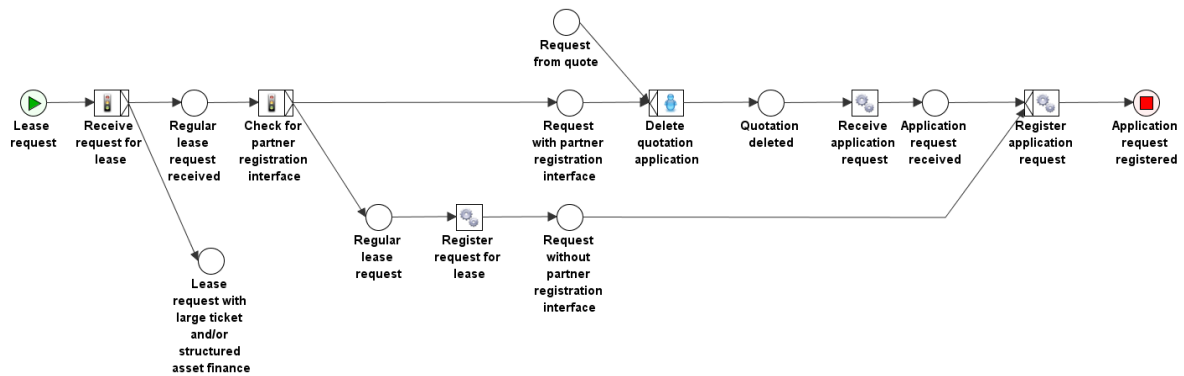
Figure 9: part 1 of the lease request process at DLL

In Table 4 the process steps from Figure 9 are explained in short, for an extensive description of the process steps please refer to appendix 4. The process blocks with a traffic light will not be described, because these process blocks are for routing only and do not need further explanation.

Process step	Description
1. Register request for lease	Every lease request process starts naturally with receiving a lease request; this request can be received by email/fax/phone.
2. Delete quotation application	If a quote exists of the lease request this quote is deleted to create a new contract and exposure.
3. Receive application request	An application request is sent from the partner to the DLL front office systems
4. Register application request	The lease request is registered in @oncefinance 2.0 in case of a request by email/fax/phone an employee of De Lage Landen. When a partner has eCs installed the application is registered in @oncefinance 2.0 automatically.

Table 4: description of the process steps from part 1 of the lease request process
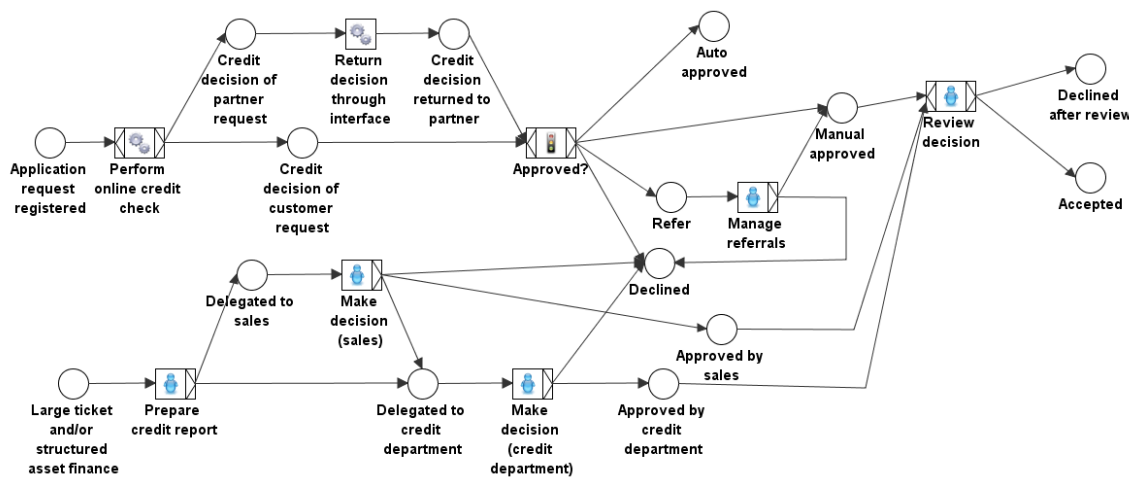
Figure 10: part 2 of the lease request process at DLL

In Figure 10 presents the continuation of the process presented in Figure 9. The process presented in Figure 10 has two points of entry; "application request registered" and "large ticket and/or structured asset finance". The former following the end of the process presented in Figure 9, the latter follows after the routing process step in Figure 9. The process model in Figure 10 has four ending states; "Declined", "Declined after review", "Auto approved" and "Accepted". In Table 5 the process steps from Figure 10 are described, for a more detailed explanation please refer to appendix 5.

Process step	Description
5. Perform online credit check	After the application is registered the systems automatically generates a decision based on the provided details of the customer and lease object
6. Return decision through interface	When the customer has eCs installed the decision is directly communicated
7. Prepare credit report	If the application is a structured asset finance deal, sales will start creating a credit report. The risk is assed and communicated to sales.
8. Make decision (sales)	If the decision on the lease application is within the authority of the sales department, sales manually decides whether the application is declined or accepted. If the situation asks for it additional information is gathered from the customer or a third party
9. Make decision (credit department)	The credit department manually decides whether the application is declined or accepted. Additional information is gathered if the situation asks for it. (the credit department makes the decision if the sales department is not authorized to make the decision)
10. Manage referrals	Lease applications that are not automatically accepted or declined will be manually be assessed. Extra information on the asset or customer is gathered.
11. Review decision	All manual decision made on a lease application are reviewed. Decisions can be revoked.

Table 5: description of the process steps from part 2 of the lease request process
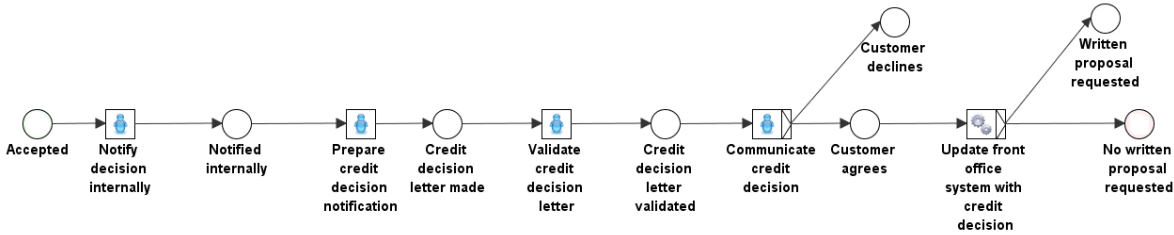
Figure 11: part 3 of the lease request process at DLL

When a manual credit decision is approved the process continues with the process presented in Figure 11. In table 6 the process steps are described, a more detailed description of the process steps can be found in appendix 6. The process model presented in Figure 11 has three ending states; "Customer declines", "Written proposal requested" and "No written proposal requested". After the state "Customer declines" the process ends or when the customer is an important potential for De Lage Landen internally discusses the possibilities for changing the proposal. After the other two states the contracting process is started. During this process the credit decision is checked again and if the decision is no longer valid, because some time have passed and the situation concerning the credit decision has changed. In this case the lease request process is restarted.

Process step	Description
12. Notify decision internally	The appropriate departments are notified about the credit decisions
13. Prepare credit decision notification	The credit decision is prepared to communicate to the customer/partner. If there are any conditions these are included in the document
14. Validate credit decision letter	The credit decision document is validated
15. Communicate credit decision	The credit decision is communicated to the customer/partner; this is done by phone or email. When a customer want a credit decision letter is printed and send on paper.
16. Update frond office system with credit decision	The front office system is updated with the credit decision. If requested in the previous step an official credit decision document is made up.

Table 6: description of the process steps from part 3 of the lease request process

The lease request process is combined with the functionalities of the organizational structure that supports the process. The numbers presented in the tables that describe the process steps correspond to the numbers that are presented in Figure 12.
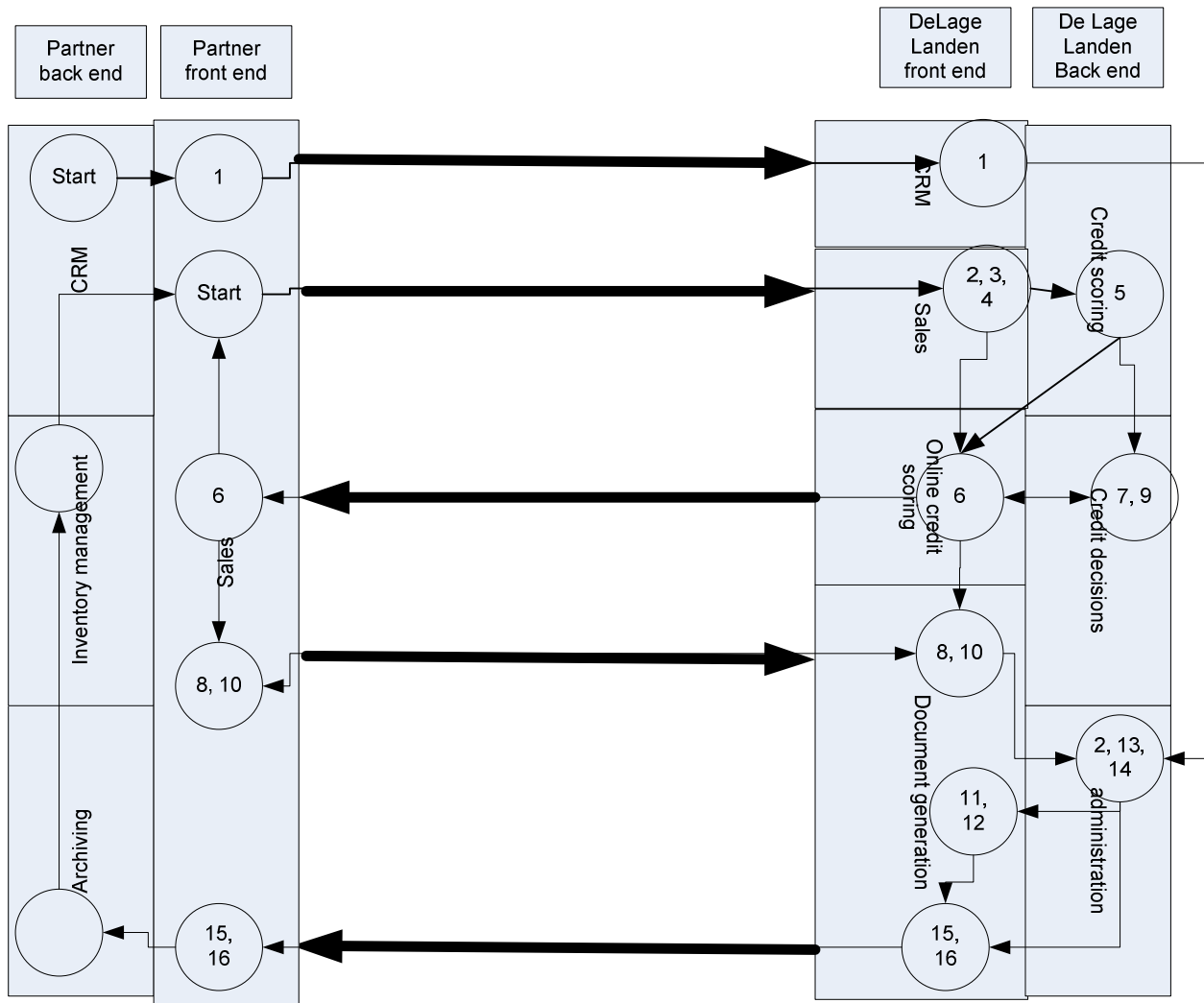
Figure 12: organizational picture mapped with the lease request process

Figure 12 shows the organizational structure that is related to the process of lease request. The process steps are mapped on to the organizational structure by the circles with numbers. The numbers, as mentioned before, correspond to the process steps that are describes in Table 4, Table 5 and Table 6. The process starts at the partner represented by the circles "start" in the figure above. The empty circles after process step 15 and 16 are internal process steps at the partner, which are not included in the process description of "lease request".

4.2.2.1. Operations and Change Management

Operations management is according to (Grefen, 2007) with respect to the e-business situation, managing the inter-organizational relations between organizations. In this context operations management has three important aspects:

- Synchronizing business relations: Part of De Lage Landen's mission statement is partnering. De Lage Landen is actively involved with its partners and before eCs is installed locally at the partners business, De Lage Landen seeks active cooperation and makes sure that a certain level of trust is established between De Lage Landen and the partner.
- Synchronizing process states: eCs returns immediate feedback on the credit decision, if a credit decision has to be made manually eCs also returns this message. When De Lage Landen has to make a manual decision it contacts the partner to gather additional

information and De Lage Landen informs the partner immediately through the e-business process.

- Synchronizing data states: Because both front end systems are linked to each other it is secured that both systems are synchronized concerning the data states.

Change management takes an important place within the managing activities of De Lage Landen. The Beacon project, as mentioned before, describes how changes should be managed throughout the organization of De Lage Landen. Awareness is created by frequent updates on the progress of developments; these updates are communicated to employees by email and communicating it through TrueBlue.

4.2.3. Architectural aspect

According to Grefen (2007), the architecture of the system is "a blueprint for e-business information systems". Being a blueprint, the architecture provides a pivotal point in e-business application development and design. The 'real world', being the Business and Organization level, is to be translated to the virtual world, Technology (see appendix 7 for a depiction of architecture as a pivotal point). Figure 13 shows the high level architecture of De Lage Landen.
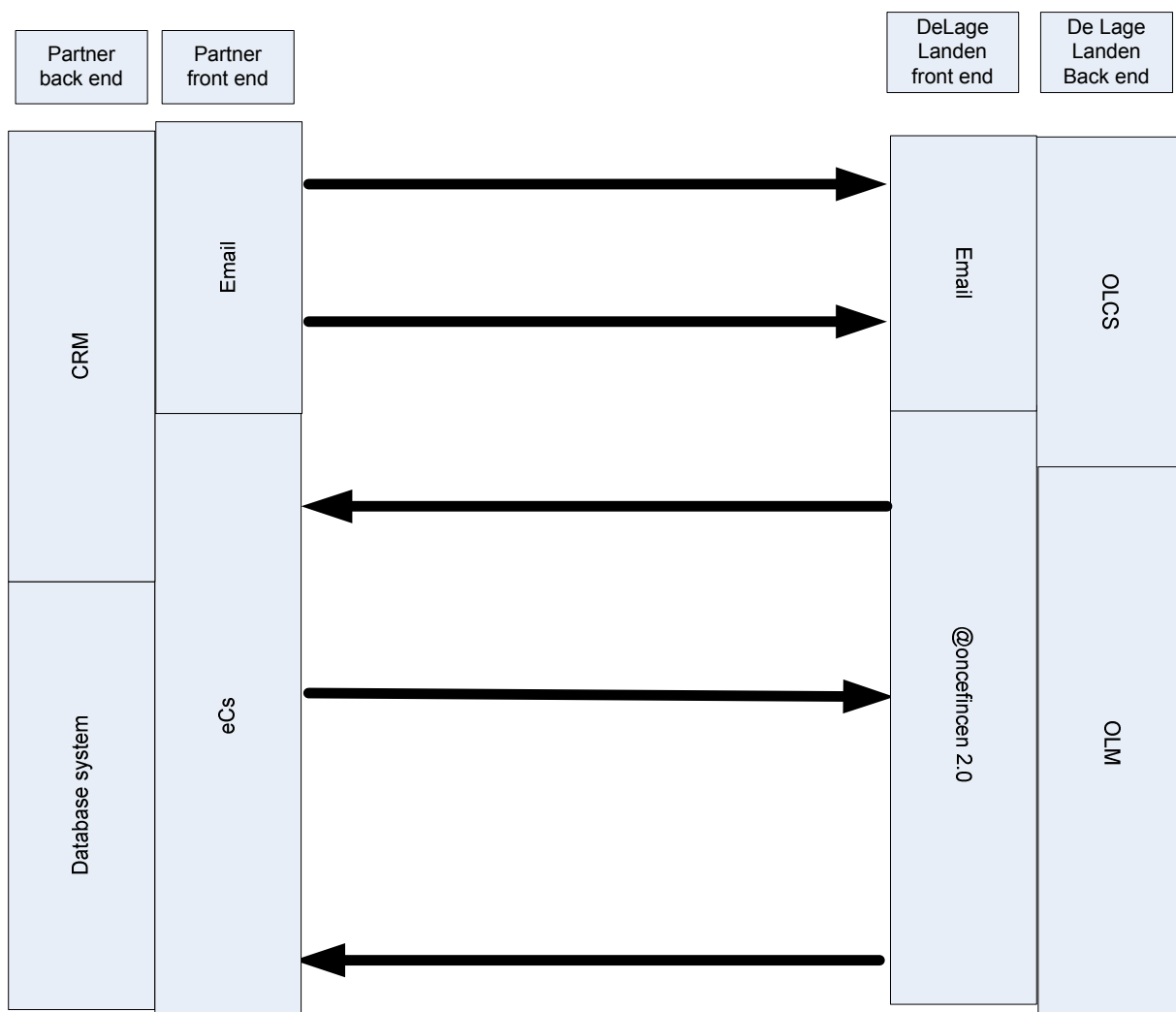
Figure 13: high level architecture of DLL lease request process

The medium level architecture is more detailed representation of the De Lage Landen side of the high level architecture presented in Figure 14.

4.2.4. Technological aspect

The interface that partners use needs to communicate with the systems of De Lage Landen. For executing this communication logically TCP/IP is used. In the future De Lage Landen is planning to make eCs available through the web. When this is implemented can find html will also take its place in the technology aspect of De Lage Landen. Besides offering eCs functionalities over the internet De Lage Landen is also working on implementing a portal where partners and potential partners can go to, to check all kinds of information about De Lage Landen and products they offer.

The architecture of De Lage Landen is divided into autonomous environments that may only communicate to each other using the message or data bus. The autonomous environments embody several functionalities and can be considered more aspect-oriented than function-oriented. An example of an autonomous environment is e-archiving that can be related to a range of modules in the A and O elements.

Besides the above mentioned technological aspect it is also important to note that security and trust are an important factor in partnering with the potential partners. Because a lot of financial data and confidential information is sent and received between the partner and De Lage Landen, security of the data is very important. To ensure secure data interchange De Lage Landen uses encryption of data, the local laws and regulation with respect to encryption of data is always checked. This to make sure the data is sent secure, according to the sensitivity of the data, and within the laws and regulations of the country at hand.

5. The e-business maturity model

This chapter will explain the different characteristics of the e-business maturity model, which is the main goal of this thesis. The goal of the chapter therefore, is to explain the choices that are at the basis of the e-business maturity model as well as to present the detailed description of the final model that is designed. To result in an applicable e-business maturity model this chapter starts with laying the foundations by discussing the criteria the e-business maturity model (eBMM) should meet. Then the maturity levels of the eBMM are described in detail. Next the assessments that need to be conducted are explained to be able to determine the maturity of an organization. In the fourth part of this chapter the assessments and maturity levels are linked to each other and finally the most important characteristics of the eBMM are laid out.

5.1. The e-business maturity model

The goal of the e-business maturity model is to assess how mature an organization is with respect to conducting e-business. As discussed in chapter 2 the CMM is a maturity model which assesses the software development processes. The focus of the CMM is on the capabilities of an organization concerning processes of software development. The models that are inspired on the CMM have the same focus and therefore describe the maturity levels in terms of how these processes are organized. The maturity levels range from initial or ad-hoc to an optimized level. The eBMM does not concern the maturity of e-business development processes, because the maturity of the e-business development process does not say anything about the maturity of an organization concerning e-business. Maturity of e-business development process rather determines how well an organization is in developing IT, with in this case e-business applications. The goal of the eBMM is to assess an organization's e-business maturity based on the place of e-business in the organization, the cooperation with partners and the technical characteristics concerning e-business. Therefore the maturity levels of the CMM and the model that are inspired upon it do not apply the eBMM, with respect to the before mentioned goals of the eBMM. In case of the eBMM, an organization can be seen as an entity that has a certain experience with e-business and incorporated e-business into the organization to a certain extend.

From the in chapter 2 presented definition of e-business, can be extracted that e-business is about *inter-organizational core business activities* and *integrated use of information technology*. In addition, the literature study have put forward three aspects of e-business which are; cooperation, strategy and change. The cooperation aspect together with the inter-organizational core business activities lead to the first group of aspects that have to be assessed in order to come to an e-business maturity level: inter-organizational aspects.

The strategy and change aspects, which were discussed in the literature study, are the basis of a second group of aspects that need to be assessed. This group of aspects is summarized by the term intra-organizational aspects, as the strategy and change aspects concern the organization's internal characteristics. In addition also the technological characteristics of the e-business applications used influence the e-business maturity of an organization. (Layne and Lee, 2001) and (Andersen and Henriksen, 2006) both agree that the technological aspect of e-government is of great influence to the maturity. Also (Valdes et al., 2011) discuss technological aspects to assess the maturity of governmental institutions. Although the eBMM is not about governmental institution, but rather commercial organizations, the technological aspect also influences the e-business maturity of an organization. Whether it is a B2B or a G2C relation, the technological aspect plays an important role in the maturity. This result in 3 aspects that will be assessed to evaluate the e-business maturity of an organization: inter-organizational aspects, intra-organizational aspects and technological aspects. How these aspects will be assessed and on which criteria these will be evaluated will be explained in detail in chapter 5.1.1.

When the situation of an organization is assessed on the defined aspects, the organization should be able to be linked to an e-business maturity level. The e-business maturity levels will have to be defined is such a way that they do not overlap. Also the relationship between the successors and predecessors of a certain stage should be clearly defined. If these two restrictions are met, an organization that is assessed can be placed in a specific e-business maturity level and recommendations on future steps can be given to get to a higher level.

5.1.1. Aspects that lead to maturity

To assess an organization on its e-business activities a framework is needed, that describes the different aspects and evaluation criteria. As mentioned before there are three main groups of aspects, the intra-organizational, the inter-organizational and the technological aspects. (Valdes et al., 2011) describe leverage domains, which are divided into key domain areas. These key domain areas are then divided into critical values. The CMM and the CMM inspired model use a similar structure as (Valdes et al., 2011); however, they call it respectively key process areas, common features and key practices. For the eBMM the same structure is used, starting with 3 aspect groups which contain aspects and these aspects are describes by evaluation criteria.

5.1.1.1. Inter-organizational aspects

The inter-organizational aspects of e-business are, as mentioned before, derived from the fact that e-business is about inter-organizational core business activities and cooperation is an important aspect of successfully conducting e-business. The inter-organizational aspects that are assessed are awareness, cooperation and education.

When an organization is conducting e-business it should consider the situation of the partner as well, hence they should be aware of the situation of the partner. (Ray and Lewis, 2008) and (Segev et al., 2003) both agree that being aware of the stakeholders is an important issue considering e-business. As conducting e-business is about the integrated use of information technology, awareness of the partner's IT infrastructure is needed to assure a proper use of the e-business solution at the partner as well. Besides the awareness of the partner's IT infrastructure the organization which is assessed should also be aware of the partner's goals. Taking the partner's goals into account with respect to the e-business activities will strengthen the partnership as well as improve profitability of both parties.

Besides being aware of the stakeholders, an organization should also manage the cooperation with its partners. To be able to cooperate well with partners, coordination points and information availability play an important role, as (Segev et al., 2003) put forward. (Segev et al., 2003) discuss coordination points and information availability regarding both the development and the implementation of e-business solutions. Nevertheless, the importance of coordination points and information availability is also applicable to the implementation and use of e-business solutions, which are considered by the eBMM. Both during the implementation and use of the e-business solution, coordination points and information availability improve the cooperation between the partners. The synchronization of data and process states in an e-business situation are other criteria that are important for the cooperation between two partners. Without the synchronization of data and process steps the communication between the partners relies on different data or place in the process.

Finally, educating the users of the e-business application will increase the ease and correct use of the application (Valdes et al., 2011). To make e-business to a success it is important to train the users at the partner to get the full potential of the e-business solution. This can be achieved by training and

providing manuals on the e-business solution. In Table 7 the inter-organizational aspects and evaluation criteria are presented.

Aspect	Evaluation criteria
Awareness	Awareness of partner's IT infrastructure
	Awareness of partner's goals
Cooperation	Coordination points
	Information availability
	Synchronization of data
	Synchronization of process states
Education	Training
	Manuals

Table 7: the inter-organizational aspects

5.1.1.2. Intra-organizational aspects

Although e-business is about inter-organizational core business activities, it also affects the intra-organizational aspects of an organization. Conducting e-business is more than just installing an e-business application and start working with it. In existing organizations it will cause for a number of changes to the way of working. However, whatever the situation of an organization is, start-up or existing, successfully conducting e-business requires attention to several intra-organizational aspects. First of all, e-business will pose challenges on IT and to cope with these challenges in an organized way the presence of an IT architecture strategy will contribute greatly. And as (Krell and Gale, 2005), (Barnes et al., 2003) and (Borges et al., 2009) agree the IT strategy should not be a standalone strategy, but should be incorporated into the company's strategy as whole.

Secondly, educating your own employees is as important as educating the users at the partner. Therefore, education is part of both the inter-organizational and the intra-organizational aspects. The third aspect that should be assessed in the intra-organizational aspects group is "processes". (Valdes et al., 2011) include a leverage domain process management to their e-government maturity model. Part of the leverage domain process management is key domain area business process management, which is divided into three criteria; process modeling, process simulation and process monitoring. For the eBMM this is translated into process integration and process definition. Process integration is included, because the e-business supported or enabled processes should be integrated with the "traditional" processes. Process definition is part of the aspect processes, because conducting e-business with partners can only be done when the processes are well defined and changes are well documented. The aspect processes is part of intra-organizational aspects, because the processes describe the activities from the perspective of the organization that initiates the e-business solution.

The final two aspects are competitive advantages and performance gains, because conducting e-business requires investments during the introduction and this should lead to either competitive advantages or performance gains to earn the investments back. Competitive advantages can be evaluated in many different ways, but for the eBMM the reach and richness criteria are adopted from the BOAT model. Reach is about increasing the range of the business environment and richness is about increasing the frequency and intensity of communication with partners. The brick and clicks criterion refers to organizations that can conduct e-business and traditional business without the use of e-business solutions. In addition, the use of e-business solutions should also lead to performance gains to earn back the investments.

Aspect	Evaluation criteria
Strategy	IT architecture strategy
	Strategy integration
Education	Manuals
	Training
Processes	Process integration
	Process definition
Competitive advantages	Reach
	Richness
	Bricks and clicks
Performance gains	Increased efficiency
	Increased effectiveness

Table 8: intra-organizational aspects

5.1.1.3.   Technological aspects

As mentioned before, (Layne and Lee, 2001), (Andersen and Henriksen, 2006) and (Valdes et al., 2011) all address technological aspects regarding their maturity models. (Valdes et al., 2011) stress the importance of alignment of IT resources with business objectives. This translates to the eBMM by addressing the aspects functionality support, usability and customization. When these aspects are addressed by an organization it has the possibility to maximize the potential of the e-business solutions used.

The aspect support of functionalities is evaluated by functional design patterns and modularity. If these are used in the development of e-business solutions, an organization is able to adept the e-business solutions according to changes business objectives. For example, when an organization wishes to add more functions to the e-business solutions to better support the business objectives, then it is easier to add a functional module to the package than to rewrite the complete e-business solution.

The interface aspect concerns style and usability regulation, having these regulations ensures a corporate image as well as ease of use. Style regulations describe for example font, colors and logos that must be used. Usability regulations on the other hand describe the way the e-business solutions should operate concerning the use of the e-business solution. Defining the usability and style of e-business solutions, that should be similar to the other IT solutions within the company, improves the ease of use for employees.

To improve the ease of use of the e-business solution by the partners, customization can contribute in addition to educating the partner (inter-organizational aspect). As partners differ from each other, they also have different requirements concerning the e-business solution. Being flexible and able to incorporate customer requirements shows a greater maturity concerning e-business. And when an organization documents the customizations on the application, it makes it possible to easily re-use the customization and to keep a clean non-customized version of the e-business application as well. Integrating the e-business application into the IT architecture shows that an organization not just added a new application to the landscape, but really incorporated the e-business application into the root of the IT landscape. (Layne and Lee, 2001) describe vertical and horizontal integration as the 2 highest level is their maturity model. Integrating the e-business solution into the IT architecture as a whole shows similarities to the vertical and horizontal integration of (Layne and Lee, 2001) and is therefore included in the technological aspects of the eBMM.

Aspect	Evaluation criteria
Support of functionalities	Functional design patterns
	Modularity
Interfaces	Style regulations
	Usability regulations
Customization	Flexibility
	Customer requirements
	Documented customization
IT architecture	Integrated in architecture

Table 9: technological aspect

5.1.2. The maturity levels

As mentioned before the eBMM does not assess the development process but the experience with, and integration of e-business in an organization. Therefore the maturity levels of the eBMM range from newbie to expert, with newbie being level 1 and expert being the highest level 4. These names reflect the level of experience and integration of an organization concerning e-business. The e-business maturity levels are presented in Figure 15.
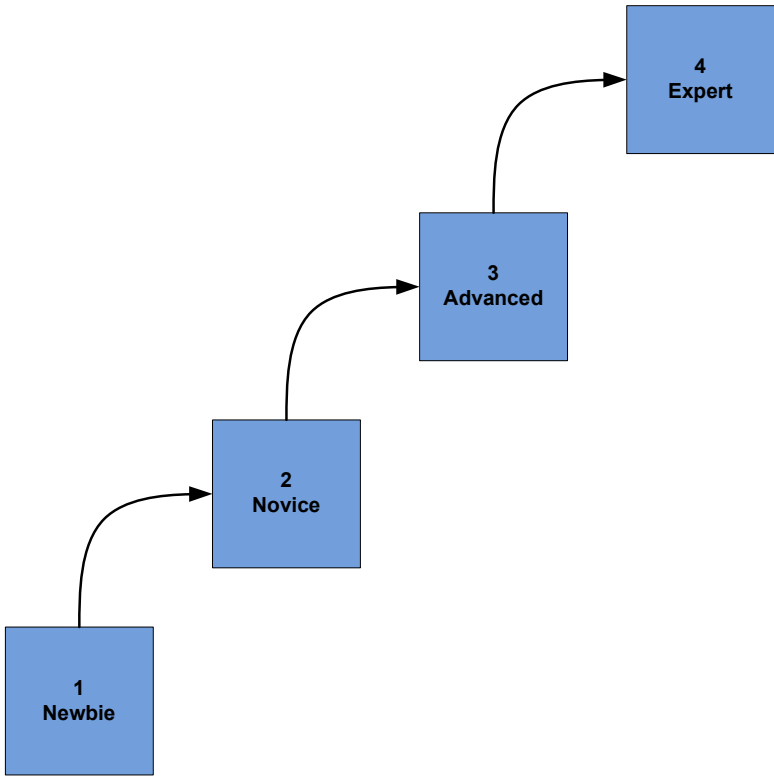

Figure 15: the maturity levels of the eBMM

The definitions of the maturity levels and how an organization can go from one level to another will be explained in the next part.

5.1.3. Evaluation methods

The evaluation criteria, which are described above, cannot be directly translated to an e-business maturity level without an evaluation method. The evaluation method of the eBMM is simple, but effective and well defined. All the evaluation criteria are evaluated on a scale of 1 to 4, where only integers can be granted to the evaluation criteria. The evaluation scale has the same number of possible scores as there are maturity levels, which makes evaluating the criteria clear, because it corresponds to a maturity level. (Valdes et al., 2011) also uses the same number of possible scores for their critical values as there are maturity levels in their model. However, (Valdes et al., 2011) allow governmental institutions to determine the weight of the critical value (evaluation criteria for the eBMM) themselves based on the national e-government implementation policies. The eBMM has as goal to determine the e-business maturity of an organization in one uniform way, so maturity levels of different organizations can be compared.

The scores from 1 to 4 that can be granted to the evaluation criteria depict to what level, an organization has incorporated that specific evaluation criterion into their organization. The scores can be translated to the 4 maturity levels, which means that every evaluation criteria should be rated based on the experience of the organization or to what extend the evaluation criterion is incorporated in to the organization. The aspects performance gains and competitive advantages have the same evaluation method, but the scores are then translated to increase of performance or competitive advantage.

Translating the scores for the individual evaluation criteria to aspects scores is done by taking the average and then round it down. This same logic is also used to calculate the average aspect group score. Although rounding down the score might look strange, because when an organization has an average aspect group score of 1,9 it is rounded down to 1. Rounding down the average is done, because a score of for example 1,9 shows that within this aspect group there are still aspects that need to be taken to a higher level. For the average aspect group the same logic applies, if an organization scores a 2 for manuals and a 3 for training it means that the organization still need to improve the manuals before an average of 3 can be granted. It would not be fair to round the average to the nearest integer, because another organization might have a score of 3 for both evaluation criteria and will be granted the same score while they are actually performing better than the other organization.

In Table 10 the maturity levels are related to the aspect scores. The scores for the aspect groups that are depicted in Table 10 for each maturity level are minimal requirements. This means that scoring 2, 4 and 3, the organization is considered to be at e-business maturity level 2. Although 2 of the 3 scores are above maturity level 2, the aspect group that scores a 2 does not meet the requirement to be in e-business maturity level 3, which is the average.

	Maturity levels			
	Level 1: Newbie	Level 2: Novice	Level 3: Advanced	Level 4: Expert
Inter-organizational aspects	1	2	3	4
Intra-organizational aspects	1	2	3	4
Technological aspect	1	2	3	4

Table 10: aspect score related to maturity levels

The exact definition of the maturity levels presented in Figure 15 can be found in Table 11. For all four of the maturity levels description is given as well as how to proceed to the next level.

Maturity level	Explanation
Level 1 – Newbie	The organization is conducting e-business according to the e-business definition from chapter 2. At least one of the aspect groups is rated with a 1.
Level 2 – Novice	The organization conducts e-business as a beginner. The organization has put effort into its e-business activities and is considering the inter-organizational aspects as well. However, the experience of the organization is still low and has not incorporated the aspects of e-business throughout the organization.
Level 3 – Advanced	The organization conducts e-business in an advanced way. The e-business activities of the organization are well defined and incorporated throughout the organizations. To grow to the next maturity level, the organization has to incorporate e-business into its day-to-day activities to the same extend the "traditional" business processes are incorporated.
Level 4 – Expert	The organization conducts e-business on an expert level. E-business is part of the day-to-day activities and will only be replaced by the "traditional" business processes if the IT systems fail. All partners use the present e-business solutions to do business with the organization under assessment.

Table 11: explanation of the eBMM maturity levels

6. The eBMM applied to De Lage Landen

In this chapter the e-business maturity model, which is described in the previous chapter, is applied to the situation of De Lage Landen. There are several ways to assess the maturity of De Lage Landen, one of them is conducting a survey among the employees. However, not many employees of an organization can give a score to all the evaluation criteria. Another way to assess the maturity is to use the results of the analysis of De Lage Landen presented in chapter 3 and 4 in combination with studying internal documents that are present at De Lage Landen servers. In this case the latter option is chosen, because it will give the most objective results. Part of the analysis presented in chapter 3 and 4 are interviews with employees of De Lage Landen, the overview of interviews conducted at De Lage Landen is presented in appendix 8. The documents on the intranet of De Lage Landen that were used are among others: the requirement document of the Beacon project, Microsoft Visio diagrams of the IT architecture, project start documents, manuals of e-business solutions, documents describing the way the e-business solutions work, process diagrams and more.

6.1. The maturity of De Lage Landen

The maturity of De Lage Landen concerning e-business is assessed using the e-business maturity model. The first step is to evaluate the three aspect groups by rating the evaluation criteria according to the evaluation method described in the previous chapter. The results of the assessment are presented in Table 12, which is a combination of all three aspect groups. Below the table each aspect is shortly discussed per aspect group.

Aspect	Evaluation criteria	Score
Inter-organizational aspects		
Awareness	Awareness of partner's IT infrastructure	4
	Awareness of partner's goals	4
Cooperation	Coordination points	2
	Information availability	2
	Synchronization of data	3
	Synchronization of process states	3
Education	Training	3
	Manuals	3
Intra-organizational aspects		
Strategy	IT architecture strategy	4
	Strategy integration	1
Education	Manuals	4
	Training	4
Processes	Process integration	4
	Process definition	2
Competitive advantages	Reach	2
	Richness	2
	Bricks and clicks	4
Performance gains	Increased efficiency	2
	Increased effectiveness	2
Technological aspects		
Support of functionalities	Functional design patterns	3
	Modularity	3
Interfaces	Style regulations	3
	Usability regulations	3
Customization	Flexibility	2

	Customer requirements	3
	Documented customization	4
IT architecture	Integrated in architecture	3

Table 12: results of the assessment of De Lage Landen with the eBMM

6.1.1. Inter-organizational aspects assessment

The awareness of De Lage Landen concerning the partner's IT infrastructure and goals are both rated by a 4, because De Lage Landen's strategy includes partnering as a strategic focus (appendix 2). The high level process description also shows that partnering is an important process step in the overall process of De Lage Landen. The cooperation aspect is assessed by four evaluation criteria of which coordination points and information availability are rated with a 2. As long as a lease request falls within certain boundaries the number of coordination point and the information availability is more than sufficient, because online credit scoring returns a credit decision almost immediately. However, when a lease request is for a very large asset or the lease request has to be referred for some reason, the process time increases significantly, but the coordination points and information availability do not increase accordingly. The synchronization of data and process states are rated 3, because in general the states and data are synchronized. However, in special cases such as a referral the data and process states at De Lage Landen are not synchronized with the partner, because much of the work is done by hand.

The education aspect is rated with 3, because De Lage Landen has good manuals and training. Nevertheless, not all partners are very eager to use the e-business solution and with good training and manuals the partners should be convinced to use the e-business solution as it has efficiency benefits for the partners as well.

6.1.2. Intra-organizational aspects assessment

The strategy aspect concerns IT strategy and strategy integration. The Beacon project at De Lage Landen is an actualization of the IT strategy De Lage Landen has. However, the IT strategy of De Lage Landen is not integrated with the overall strategy of the company. Therefore, the IT strategy is rated 4 and the integration of IT strategy with 1, which gives an average of 2,5. The education aspect of the intra-organizational aspect group is rated 4 for both training and manuals, because within the organization the training of employees and the availability of manuals is on a good level.

Process integration and process definition are the two evaluation criteria of the aspect process and are relatively rated with 4 and 2. Process integration is on a high level, because the processes that are supported by the e-business solution are integrated with the "traditional" processes. The process definition evaluation criterion is on a low level, because many process definitions on the server are not up-to-date. Nevertheless, the Beacon project also includes updating process definition, so when the project is finished the process definitions should be on a high level again. However, it will be important for De Lage Landen to keep them up-to-date at all times.

The competitive advantages reach and richness are rated both with a 2, because De Lage Landen could have increased the reach and richness even more. Although partnering and knowledge of the local market is a strategic decision of De Lage Landen, the e-business solution could have been used to increase the geographical reach. In addition the level of detail and used media could also been increased with the introduction of the e-business solutions. On the other hand the brick and click evaluation criterion is rated with a 4, because besides conducting e-business De Lage Landen is still able to do business in the traditional way if necessary. However, this is also a weakness of De Lage Landen, because many customers and partners still use the option to request a lease or quote by phone or mail. During the interviews it was explained multiple times that there are still a lot of customers that keep on using the "traditional" way of requesting a quote or lease. This causes that the efficiency and effectiveness have not increased as much as possible and therefore are both rated with a 2.

40

Calculating the averages per aspect and then the average of the intra-organizational aspects group results in a 2,6.

6.1.3. Technological aspects assessment

The first aspect to assess is support of functionalities, which is divided into evaluation criteria functional design patterns and modularity. The requirement document of the Beacon project describes rules for functional design patterns and modularity, but the current situation of De Lage Landen does not comply with these rules. The IT landscape is very fragmented and several global business units have developed own e-business solutions. Because the Beacon project describes rules concerning the evaluation criteria the criteria are rated with a 3 despite the fragmented IT landscape and standalone e-business solutions.

The interfaces aspect follows the same reasoning as the latter, because the requirements document of the Beacon project prescribes style and usability regulations. However, the situation at this moment does not comply totally with the style and usability regulations.

Customization is evaluated by the criteria flexibility, customer requirements and documented customization. The flexibility and customer requirements are respectively rated with a 2 and 3, because there is some flexibility and customer requirements are taken into account. But customer requirements are limited to the look and feel of the e-business solution. The flexibility also has its limitations, because the basic function of the e-business solution is set and at the moment there are not many choices to make by a partner. With the introduction of the new e-business solution for vendor finance new options will be available, as is described in several project start documents, and this shows there is still a lot of room for increasing the flexibility. De Lage Landen has a good policy of documenting customizations and changes to e-business solutions and therefore the evaluation criterion documented customization is rated with a 4. Finally, the aspect IT architecture, which is evaluated by the criterion integrated in architecture. This criterion is rated with a 3, because the main e-business solutions are integrated into the IT architecture especially with the execution of the Beacon project. However, because there are still e-business solutions that are specially designed for and by global business units, as the interviews put forward, the criterion is not rated with a 4.

Average scores of De Lage Landen	Averages	Rounded averages
Inter-organizational aspects	3	3
Intra-organizational aspects	2,6	2
Technological aspects	3	3

Based on this assessment De Lage Landen is currently on maturity level 2, which is labeled novice. In the next part some recommendations are given to enable De Lage Landen to go from maturity level 2 to the expert maturity level 3.

6.2.Recommendations for De Lage Landen

In this part the recommendations for De Lage Landen are discussed. The previous part described the application of the eBMM to the situation of De Lage Landen and showed that De Lage Landen has a level 2 maturity. The first step for De Lage Landen should be to go from level 2 to level 3, this can be achieved by increasing the scores for intra-organizational aspects, because the other two aspect groups already have a score of 3. De Lage Landen should especially focus on improving the performance gains and the strategy aspect. Although the competitive advantages also have room for improvement as well as the process definitions, they are less interesting. Increasing the score for reach implies that De Lage Landen should make a strategic change; however, this seems not to be an option for De Lage Landen and would also not be advisable. Improving the richness criterion might be an interesting option to explore, because increasing level of detail and used media seems possible. However, the added value of adding new kinds of media to the e-business solutions is questionable.

6.2.1. Strategy integration

As mentioned in the previous section the IT strategy is not incorporated in the company's overall strategy. To improve the score for this evaluation criterion De Lage Landen should incorporate the well defined IT strategy into company's overall strategy document. However, it is not necessary to completely add the IT strategy to the overall strategy, but a high level strategy on IT can be added to the overall strategy. By doing this De Lage Landen would be a step closer to e-business maturity level 3.

6.2.2. Performance gains

Increasing the efficiency and effectiveness of e-business within De Lage Landen is another requirement to grow to the next maturity level. The main concern for increasing efficiency should be, getting more partners and customers in the position that they will only use the e-business solution (@oncefinance) instead of calling or sending a mail to request a lease. The more partners embrace e-business the more efficient the lease request can be handled. Increasing efficiency will automatically increase effectiveness as well, because when more partners use the e-business solution the goal (the effect) will be reached. The goal is, using e-business solution to automate the lease request and quotation process. So by putting extra effort in convincing the partners to use the e-business solution at hand, De Lage Landen will increase both efficiency and effectiveness.

6.3.Evaluation of the eBMM

Evaluating a maturity model with just one case study is not the best way to go by. However, due to time constraints and the fact that the project was conducted at De Lage Landen International B.V. only the case study at De Lage Landen was used to test the eBMM. Applying the eBMM to the De Lage Landen case study shows the model is applicable. With the information gathered about the situation at De Lage Landen the eBMM can be used to assess the e-business maturity of De Lage Landen. The assessment, presented in chapter 6.1, resulted in the e-business maturity level 2 for De Lage Landen. Based on my experience at De Lage Landen and the results from the interviews this maturity level 2 seems to be a plausible result. The interviews have put forward that despite of the available e-business solutions, many partners still prefer to call or email for a lease or quote request. In addition, the goals of the Beacon project and the development of an improved e-business solution show that a lot of e-business related developments still need to be carried out, e.g. the style and usability regulations as well as the coordination aspects of the eBMM. So it can be concluded that the eBMM is applicable and gives a plausible result for the applied case of De Lage Landen.
The completeness of the assessed aspects cannot be determined based on the assessment of the case of De Lage Landen. Although the assessment of De Lage Landen gives a plausible result, the

quality of the eBMM is not 100% validated. To validate the quality of the eBMM more cases should be applied and then the results of these assessments should also give plausible results to be able to confirm the quality of the eBMM.

The evaluation scales and rounding down the scores does work for the De Lage Landen case, but to validate this again more cases should be applied. Nevertheless, the evaluation scales and rounding down the scores are argued choices and show promising first results for the De Lage Landen case.

Finally, it can be concluded that applicability is validated by applying the eBMM to the De Lage Landen case and the resulting e-business maturity level is a plausible results taking into account the expectation before applying the eBMM. The completeness of the aspects and the quality of the evaluation method as well as the eBMM as a whole still need to be validated by applying the model to more case studies.

7. Conclusions and reflection

In this chapter presents a reflection on research questions posted in chapter 1 of this thesis. The second part of this chapter will conclude with recommendations about further research.

7.1.Research questions

The research questions presented in chapter 1.2 are revisited and discussed in this part.

- What is the state of the art knowledge of e-business in the broadest sense of the subject?

The literature study on e-business presented in chapter 2 includes scientific articles from the past decade as well as some earlier ones. This shows that the presented literature study is not based on out dated knowledge of e-business. Nevertheless, the development and history of e-business is also shortly addressed to put everything in perspective.

- What is a maturity model and are there any examples in other fields of business?

In chapter 2.4 the literature study on maturity models is presented, which show that maturity models are not a new phenomenon. In the field of information technology the first maturity model was developed in 1973. Although this was called a stage model, it was the first development in a long history of maturity models. However, (Kuznets, 1965) already stated what a maturity or stage model should be. In chapter 2.4 there is also a discussion on maturity models from other fields of business and also some maturity models that are closely related to the eBMM.

- How can the maturity of e-business activities of an organization be measured using a maturity model?

The literature study in combination with the case study resulted in the eBMM, which is a first maturity model for e-business. Addressing the inter- and intra-organizational aspects as well as the technological aspects is a way to measure the maturity of an organization concerning e-business. The three aspect groups together cover the main characteristics that are important to measure the e-business maturity of an organization. Specifying these aspect groups into the evaluation criteria, which are presented in chapter 5, allows an organization to assess its e-business maturity.

- What is the maturity level of De Lage Landen using the designed e-business maturity model?

The maturity level of De Lage Landen is level 2, novice, which is explained in detail in chapter 6. Although De Lage Landen performs well on the inter-organizational and technological aspects the maturity level of De Lage Landen is level 2, because the intra-organizational aspects do not meet the requirements of maturity level 3.

- How well does the developed e-business maturity model perform?

In the chapter 6.3 the eBMM is evaluated and from that can be concluded that the eBMM is applicable and gives a plausible results for the case of De Lage Landen. In addition, the developed eBMM does meet the requirements of a maturity model. To validate the quality of the eBMM, more cases should be applied and the results should be compared. Because of time constraints and the fact that De Lage Landen enabled this research only the case of De Lage Landen was used for testing. Although applying the eBMM to more case studies will help determining the performance of the eBMM, the result of the assessment at De Lage Landen is plausible.

7.2. Further research

To determine the performance of the e-business maturity model additional case studies should be performed and assessed with the e-business maturity model. When several case studies are performed the resulted maturity levels can be compared and adjustments to either the evaluation criteria or evaluation method can be proposed. It might be an option to investigate if weights should be added to the evaluation criteria, because not all evaluation criteria might influence the maturity equally.

Another option for further research is additional literature study or brainstorming about additional or other evaluation criteria. This can cause some evaluation criteria to be dropped or adjusted. In addition the model of (Valdes et al., 2011) used other models in the field of e-government to assess the maturity of e-government. This could also be an option that can be researched for the e-business maturity model. The eBMM developed in this thesis used for example (Plant et al., 2003) as an inspiration for the evaluation criteria. However, it might be an option to use the model of (Plant et al., 2003) as a part of the assessment rather than an inspiration.

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9. Index appendices

Appendix 1 – Financial report of 2010 – De Lage Landen

Key figures					
Equity	2,181	2,395	2,573	2,725	2,933
Tier I ratio			17.0%	17.7%	18.3%
Income statement					
Income	843	996	1,015	1,025	1,183
Operating expenses	-488	-592	-602	-611	-684
Valuation adjustments	-84	-103	-112	-304	-232
Taxation	-65	-67	-66	2	-66
Net Profit	**206**	**234**	**235**	**112**	**201**
Ratios					
Net profit growth	13.3%	13.8%	0.3%	-52.2%	78.9%
Portfolio growth	23.0%	9.9%	12.5%	2.9%	6.3%
Income/cost ratio	1.73	1.67	1.68	1.68	1.73
Personnel					
Number of FTEs	4,428	4,735	4,965	5,115	5,257
Geography					
Number of countries DLL operates in	29	29	32	34	35

Appendix 2 – De Lage Landen mission and competences

Mission

This is what we are, what we do and how we do it.

We are an <u>international</u> provider of <u>high-quality, asset-based finance</u> products that, through <u>partnership, helps clients</u> realize their goals. In doing this, we strive to optimize our profits.

Ambition

This is about our core objective, the driving force of our company.

We want to be '<u>Best in Class</u>'.

Put in other words: we want to be <u>the best at what we do</u>, rather than to be the biggest.

Core Value

This is the guiding principle for De Lage Landen organization and all its members, in their actions and behaviors, internally and externally. Our pride is founded on this core value and our company culture should be the result of living by this principle.
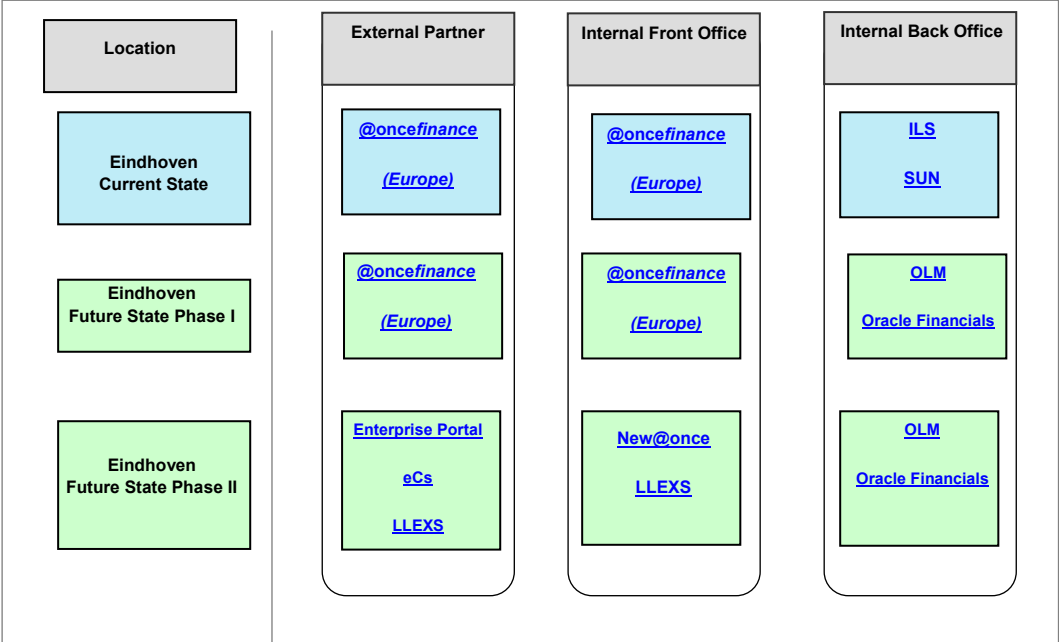
Partnership

Core Competences

Taking true partnership as a starting point De Lage Landen as an organization, and all its members should demonstrate behavior, internally and externally, that is in line with the four core competences.

Competence	Why this Competence	Behavior
Entrepreneurial Defined as: To act in an entrepreneurial way balancing the interests of the clients and the organization	Entrepreneurship is the basis of De Lage Landen's success. It can be taken literally, as if each one of us within De Lage Landen is proprietor of our own business, with all associated inspirational elements, and is responsible for the balance between the interests of the client and the continuity and profitability of De Lage Landen	▪ Identify and act on opportunities ▪ Innovate – then initiate ▪ Focus on execution and results ▪ Be pro-active
Knowledgeable Defined as: To demonstrate professional knowledge of business developments, and to utilize this knowledge	To serve the customer best, De Lage Landen needs extensive knowledge of its business as well as a thorough understanding of its clients, their businesses, their industries, and markets. Only by applying our knowledge can we deliver added value throughout all the components of the value chain – the foundation of DLL's business model – from	▪ Acquire extensive professional knowledge and gain practical experience ▪ Use the knowledge acquired and experience gained to achieve our goals with increasing efficiency ▪ Constantly seek to develop and implement state of the art concepts and best practices

	origination to asset management.	
Accountable Defined as: To take ownership for the objectives of the organization even if outside your area of responsibility	De Lage Landen can grow only if all individuals are given responsibility and consequently take ownership. Not only for their own behavior and actions, but also for the entire De Lage Landen organization and its customers. 'Focus' and 'finish what you start' are key elements in the desired behavior of all De Lage Landen members.	• Take responsibility for your own actions • Feel co-responsible for the end result • Deliver what you promise • Reward and recognition based on merits and achievements • Feel responsible for results and processes, even if outside your area of responsibility • Admit your mistakes, quickly correct them, and learn from them.
Co-operative Defined as: To contribute to a collective result, even in situations where the co-operation concerns a matter that does not directly serve one's own interest. To share information and knowledge with others.	Our business is based on partnership – our success is measured by the success of our partners. Just as we expect close co-operation with our partners to produce a join result greater than we could achieve individually – we expect the same co-operation among De Lage Landen employees to yield collective excellence to leverage capabilities of the whole company for our customers. Simply put, individual excellence is insufficient for profitable growth.	• Develop and take advantage of synergies within the group • Actively share ideas and knowledge • Practice transparent communication and decision taking • Honesty • Mutual respect

Appendix 3 – Description of De Lage Landen systems

Building Blocks of De Lage Landen's New Business System

Location	External Partner	Internal Front Office	Internal Back Office
Eindhoven Current State	**@once*finance* (Europe)**	**@once*finance* (Europe)**	**ILS** **SUN**
Eindhoven Future State Phase I	**@once*finance* (Europe)**	**@once*finance* (Europe)**	**OLM** **Oracle Financials**
Eindhoven Future State Phase II	**Enterprise Portal** **eCs** **LLEXS**	**New@once** **LLEXS**	**OLM** **Oracle Financials**

- **@once*finance*:** DLL's proprietary e-commerce tool and a major market differentiator for our company; different versions exist for both the U.S. and Europe; used by our external partners to enter / view the status of existing applications. The Wayne version permits partners to view contract information on booked business or request termination quotes.

- **eCs:** the user interface for New@once, this application will be used by our external partners to enter new apps and to query existing applications and contracts; eCs will be modified to use SuperTrump, DLL's global pricing tool, and to "call" our New@once system to execute core Front Office processing, such as credit processing, document generation etc.

- **Enterprise Portal:** this exciting new tool, which will provide a single point of entry for all DLL Web users, is being developed by the Global E-Commerce Team. Currently, external users must visit several different Web sites, depending on which DLL functionality they want to use; the Portal will recognize the user log-in and give them access to all their data and the applications necessary to accurately process that data

- **FOS:** used by Construction & Industrial BU Partner Schmitz Cargo bull for application entry; solution will be replaced with eCs during Beacon Front Office deployment in Europe

- **ILS:** currently used in Eindhoven to process lease management transactions within the Back Office; this will be replaced by OLM

- **LLEXS:** used by Rabobank branches in the Netherlands for application entry; this will remain in place for the next few years

- **New@once:** DLL's new Front Office application will be used globally for application entry by internal business users and for all Front Office transactional processing; this includes credit processing, pricing, doc generation, booking etc, whether the application is entered in New@once or eCs

- **Oracle Lease Management (OLM) / Oracle Financials**: integrated within OLM, this application processes all lease management and financial accounting application transactions from booking onward. These functions previously were performed by a separate system. Some functions, such as asset remarketing, lease profitability and business intelligence reporting are performed outside the Oracle solution.

- **SUN:** currently used in Eindhoven to process all General Ledger Financial Accounting transactions; application is "connected" with ILS so that financial transactions are processed for all leasing transactions processed; will be replaced by Oracle Financials when Beacon Release 2, goes live in Eindhoven

Appendix 4 – description of lease request process part 1

Lease request	
Name	Receive request for lease
Description	A lease request is received by fax/email
Actors	Sales Manager sales(for large deals or accounts)
Data in	Request for lease
Data out	Meeting request Pipeline report
IT support system	@Once finance LLexs

Lease request	
Name	Delete quotation application
Description	An application may be entered for quotation purposes earlier, this application should be withdrawn as the registration via the interface creates a new contract and exposure.
Actors	Vendor, sales
Data in	Quotation
Data out	-
IT support system	@once finance

Lease request	
Name	Receive application request
Description	An application request is sent from the partner to the DLL front office systems
Actors	IT, manager sales support, vendor
Data in	Application request
Data out	Application request
IT support system	@once Finance, eCs

Lease request	
Name	Register application request
Description	Enter detail on the customer: - Company ID number - Asset type - Amount - Duration - Financial product If vendor is authorized he can do it himself
Actors	Vendor, sales support officer
Data in	Customer data/application
Data out	Lease application

IT support system	LLexs
	@once finance

Appendix 5 - description of lease request process part 2

Picture *.* Lease request	
Name	Prepare credit report
Description	If the application is a structured asset finance deal, sales will start creating a credit report. After receiving an advice of the SAF manager, sales will send it to the local risk committee for advice, the decision is made in the risk committee in Ireland
Actors	Sales support office
Data in	SAF application
Data out	Credit report Decision of risk committee in Ireland
IT support system	MS Office word

Picture *.* Lease request	
Name	Perform online credit check
Description	The system will auto decide on application entered. Customer group exposure is not captured in OLCS
Actors	Sales support officer
Data in	Decision tree Score card
Data out	Credit decision
IT support system	OLCS

Picture *.* Lease request	
Name	Return decision through interface
Description	The application request answer is sent to Océ sales system from DLL automatically
Actors	IT, Manager sales support
Data in	Application request
Data out	Application results - Calculation - Score results
IT support system	@once Finance

Picture *.* Lease request	
Name	Manage referrals
Description	The partner is contacted(if needed) and extra information is gather to make a manual decision
Actors	Sales support
Data in	Referral application
Data out	Decline or accept

IT support system	Graydon
	CoC
	@once
	CRS
	ILS
	TrueBlue

Picture *.* Lease request	
Name	Review decision
Description	The credit decisions are reviewed by sales and they decide if they agree with the decisions. A decision can be "on hold" from the risk committee
Actors	Sales support officer
Data in	Manual credit decision
Data out	Accept decision or decline decision
IT support system	MS Office word

Picture *.* Lease request	
Name	Make decision (sales)
Description	A manual credit decision is made
Actors	Sales support or credit underwriter
Data in	Customer file
	ASR report
	Customer data/application
Data out	Decline/approve application can be with conditions
IT support system	TrueBlue

Picture *.* Lease request	
Name	Make decision (credit department)
Description	A manual credit decision is made on a lease application, if needed advice is asked from the risk committee
Actors	Credit underwriter
Data in	Customer file
	Corporate credit risk management policy
	PD policy
	CCS credit list
	Financial data
	ASR report
	Credit report
	Request for additional customer information or guarantees
	A.A.P. regulations

	ERC/LRC regulations ERC/LRC rating and authorization levels Minutes risk committee
Data out	Credit decision Customer file Approval extend pre funding amount Minutes risk committee
IT support system	LARS TrueBlue

Appendix 6 - Description of lease request process part 3

Picture *.* Lease request	
Name	Notify decision internally
Description	The credit decision is notified internally
Actors	Sales support officer
Data in	Credit decision
Data out	Credit decision
IT support system	-

Picture *.* Lease request	
Name	Prepare credit decision notification
Description	The credit decision for the partner is prepared and documented
Actors	Sales support officer
Data in	Credit decision
Data out	Credit decision
IT support system	MS Office word

Picture *.* Lease request	
Name	Validate credit decision letter
Description	The credit decision is validated with a credit decision report
Actors	Sales support
Data in	A.A.P. regulations Credit decision letter
Data out	Validated credit decision letter
IT support system	LLEXS @once finance

Picture *.* Lease request	
Name	Communicate credit decision
Description	The credit decision is communicated to the partner by phone call or written.
Actors	Sales support officer, vendor
Data in	Credit decision
Data out	Pipeline report (some BU's) Credit decision letter
IT support system	Excel

Picture *.* Lease request	
Name	Update front office system with credit decision
Description	The front office system is update with the credit decision

Actors	Sales support office
Data in	Credit decision
Data out	Updated front office system file for customer
IT support system	LLEXS @once FOS

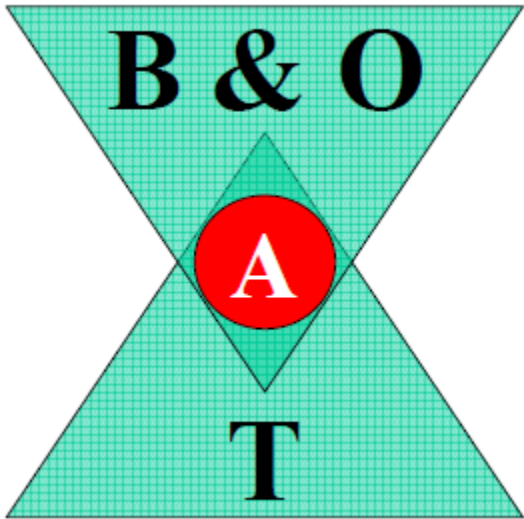## Appendix 7 – BOAT, architecture as pivot point

Figure 16: Architecture as pivot point (Grefen, 2007)

Appendix 8 – interviews conducted at De Lage Landen

Last name	First name	Department
Boumans-Van Dongen	Mireille	Project office CSU
Bijlsma	Idwer	Factoring
Cremers	Patrick	Commercial Finance
Eersel, van	Wido	Enterprise Architecture
Gerwen, van	Nicole	Banking and Leasing
Mekel	Tijmen	Athlon Car Lease International
Struycken	Stijn	Vendor Finance