LAMK Lahden ammattikorkeakoulu
Lahti University of Applied Sciences

Developing eLearning as an industrial service

Case: Corporation X

LAHTI UNIVERSITY OF APPLIED SCIENCES
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RINNE, SANNI:

Verkko-oppimisalustan kehittäminen teollisena palveluna
Case: Yritys X

Palveluliiketoiminnan opinnäytetyö 88 sivua, 22 liitesivua

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TIIVISTELMÄ

Opinnäytetyö käsitteli teollisten palveluiden kehittämistä ja verkko-oppimista. Opinnäytetyön tarkoituksena oli suunnitella käytännöllinen, käytettävä ja massaräätälöitävä eLearning-palvelu Yritys X:lle. Yritys X on lahtelainen teknologiayritys, joka tuottaa koneita ja palveluja puutuotteiden valmistajille. Opinnäytetyön tekemisen aikana Yritys X pilotoi eLearning palveluaan, joka toimi myös opinnäytetyön lähtökohtana.

Tietoperusta koostui lähinnä kirjoista ja elektronisista lähteistä, kuten tutkimusartikkeleista ja luotettavista nettisivuista. Opinnäytetyöprosessi seurasi pää osin tietoperustassa esitettyä uuden palvelun kehittämisen mallia.

Toiminnallisessa osuudessa havainnointia käytettiin menetelmänä kerättäessä tietoa käyttäjistä. Oppimisalustan valintaa ohjasi viisiaskelinen suunnitelma sekä pisteytysasteikko nollasta neljään. Service blueprintingia, asiakaspolkuja ja käyttäjäprofiileja hyödynnettiin lopullisen palvelun kuvaamisessa.

Opinnäytetyössä selvisi, että käyttäjillä ei ole työpaivän aikana aikaa verkko-opiskeluun sekä, että interaktiivinen opetus ja aikaisempi tietotaito motivoivat käyttäjiä. Selvisi myös, että organisaation tarpeisiin mukautuva oppimisalusta on tärkeä. Vaatimuksiksi oppimisalustaa varten valikoituivat alustan ulkoasu, käytettävyys, kyselyt, kokeet, kurssien hallinta, linkit, käyttäjien hallinta, analytiikka, palveluntarjoaja, alustan asettelu, navigaatio, kielivalinnat, saavutettavuus, kyky vastata kasvavaan käyttäjämäärään, kyky olla helposti muokattavissa ja hinta. Käytettäessä näitä vaatimuksia oppimisympäristön valinnassa sopivimmaksi oppimisalustaksi valikoitui iSpring Learn. Opinnäytetyössä esitetty alusta on massaräätälöity ja käyttäjä-ystävällinen kokonaisuus, joka ottaa huomioon opiskelijan sekä alustan hallitsijan tarpeet.

Asiasanat: teollisuuden palvelut, massaräätälöinti, asiakasarvo, käytettävyys, eLearning

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RINNE, SANNI: Developing eLearning as an industrial service
Case: Corporation X

Bachelor's Thesis in Service Management 88 pages, 22 pages of appendices

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ABSTRACT

The thesis deals with the development of industrial services and digital learning. The purpose of the thesis was to design a functional, usable and mass customizable eLearning service for Corporation X. Corporation X is a Finnish technology company that provides machinery and services for the wood product industry around the world. Corporation X had an ongoing eLearning pilot, which worked as the basis for the eLearning service presented in the thesis.

The theoretical part of the thesis mostly relied on books and electronic sources, such as research articles and online material. The thesis process mostly followed the new service development model presented in the knowledge base.

Information about users was gathered through observation. For the evaluation and selection of a correct learning management system (LMS), a five step plan and a scale for scoring from 0-4 were implemented. Service blueprinting, customer journey maps and user profiles were used for depicting the final service.

According to the findings of this thesis, users do not have time to study online during their workday and interactive teaching and previous knowledge motivate users at training. It was also discovered that it is important that a learning management system can adapt to an organization's needs. Regarding Corporation X's eLearning service and learning management system, the following were the most important requirements: platform appearance, usability, surveys, exams, course management, links, user management, analytics, service provider, platform lay-out, navigation, language options, accessibility, the ability to handle increasing number of users, the ability to be easily modified and price. By evaluating different LMSs according to these requirements, iSpring Learn turned out to be the best option for Corporation X. The outcome of the thesis is a mass customized and user-oriented platform that considers the needs of users and administrators.

Keywords: industrial services, mass customizing, customer value, usability, eLearning

CONTENTS

1 INTRODUCTION

Industrial services are a discussed topic in the manufacturing industry as companies are beginning to see that they need to increase services to grow and maintain their business. Industrial services offer many opportunities: expanding to other areas or markets, gaining more profit and growth and developing a better relationship with the customer (Grönroos, Hyötyläinen, Apilo, Korhonen, Malinen, Piispa, Ryynänen, Salkari, Tinnilä & Helle 2007, 8-10.) Many companies in the industrial sector have noticed this and are expanding their business to services.

Usually, industrial services revolve around the products that the company manufactures. Common industrial services are for example installation, measuring performance and maintenance work. A good example of this is Kone, whose maintenance and modernization services made 45% of their turnover in 2014 (Hakonen 2015). These kinds of services are built around the product and are desired by customers. To make selling and buying services easier, forerunners of industrial services have decided to sell their services in packages. Package deals usually aim to provide the services for the whole lifetime of a product and to further the relationship between the service provider and customer. (Martinsuo & Kohtamäki 2014, 9.)

1.1 Objectives

During the third year of my studies, I was aware that I wanted to do my thesis on service development in industrial services. In LUAS, I have studied service business, service development in general and developing services for the manufacturing industry. Development of industrial services interested me a lot, so I decided to search a manufacturing company where I could combine my practical training with my thesis. I wanted to deepen my understanding of industrial services and put what I had learned in theory into practice; combining practical training and thesis was a good way to do it.

I ended up doing both my practical training and thesis for Corporation X. Corporation X is a Finnish technology company that provides machinery and services for the wood product industry around the world. In my practical training at Corporation X's technology services department, I started working with Corporation X's new internet training program, eLearning. The purpose of the eLearning-service is to give an option for customers to train their staff online instead of typical classroom training and/or practice at line. From Corporation X's perspective, the objective of my thesis was to develop the eLearning-service to a commercial, profitable service with which they can help their customers and customers' staff to handle their equipment better.

Generally, this thesis provides knowledge on industrial service development, which can be generalized to other services as well. Systematic development of industrial services is a relatively new subject and even though there are a lot of research articles, current studies and frameworks concerning the subject, they do not further concrete functions (Martinsuo & Kohtamäki, 9). This thesis strives to give a more functional perspective for industrial service development and to present relevant concepts necessary for understanding the subject. Modularity, mass customization and new service development are all important concepts in service development, and therefore important for everybody to understand when developing services. Digitality aspect brings a modern perspective to industrial service development and provides a framework for this thesis. Combining digitality and industrial services the thesis has novelty value and provides a unique perspective.

1.2 Research questions

When I started my thesis, Corporation X's eLearning-service was already at the last stages of new service development. A pilot was underway and a cross functional team had been formed. (Alam & Perry 2002, 525.) When writing this thesis a pilot of the service was being run with a European client that continues till the beginning of 2017. The purpose of my thesis is

not to tell what the pilot should look like or to develop a completely new service, but rather transform the pilot into a more commercial and usable industrial service. That is why a large part of the foundation of this thesis is based on the pilot.

The outcome of this thesis should be representative of Corporation X's image and easy to multiply for different clients. It should bring value to the customer and take users into consideration. The outcome needs to be a commercial service that is easy to sell and easy to use. Since the intention is to develop a training service, there are always pedagogical questions present due to the educational nature and importance of motivation in the service. Pedagogical views will not be further discussed in this thesis, since they do not concern my field of study nor are they essential for the outcome of this thesis. Still, the importance of motivation in any type of educational/training service is acknowledged. It has been a concern throughout this thesis process and it has been thought of when constructing the output, but it is not introduced through theory and it appears rarely in the text.

The objective of this thesis is to design a functional, usable and mass customizable eLearning-service for Corporation X. My thesis will answer these questions:

- How can Corporation X create value for the customer through eLearning as an industrial service?
- How to develop a usable eLearning as an industrial service?
- How to mass customize an industrial service?

This thesis is a functional thesis. Information is gathered for the knowledge base of the thesis from books and reliable sources on the internet. Books are widely used as a research method for the knowledge base and for the process phase. This thesis’ main research method is qualitative research that is mainly collected by means of observation. The observation will be executed in September by observing Corporation X's customer's employees along with their training and working environment. In this thesis

the notion of user stands for the user of the eLearning-service. Users are the employees of the customers that work in the factory closely with the machinery and to whom the eLearning service is directed.

2 DEVELOPMENT OF INDUSTRIAL SERVICES

Industrial services have long been a part of the manufacturing corporations' business in the form of favors. The services have been more or less treated as additional favors that are received along with the product, but not separately paid for. Traditionally, the product has been in the center of the business, and the services were something that the manufacturers were forced to provide. But during the last few decades, services have evolved into service business, and people are more interested in them than ever. (Martinsuo & Kohtamäki 2014, 9.)

Industrial services will become key factors for industrial businesses in global competition. To make their services a competitive advantage, companies need to evolve their services into service business and change the focus from the product to the customer. (Grönroos et al. 2007, 9.) For this a different way of thinking is required: a new scheme of things that understands the customers and their thoughts, wants and needs (VTT 2016).

In this part of the thesis industrial services and its main aspects concerning this thesis are introduced. The subject will be covered by first opening the concept of industrial services and its background. Then the models that are consequential for service development are presented: mass customization, modularity and new service development.

2.1 Industrial services

In the manufacturing industry the product has been in the center of the business for a long time, and now the competition is focusing on which company develops their product to the furthest. As global competitive pressure adds on, it has brought a need for continuous investing towards product development and finding new product innovations to stay in the competition. To gain new areas in business, it is imperative for industrial companies to develop their service business as well. (Grönroos et al. 2007, 9.) For industrial companies, one of the motivators of focusing on

services has been changing the focus off from the most competitive areas of business to service business. By doing so, they are able to increase their profitability. (Ahonen et al. 2013, 29.)

According to Hyötyläinen (2007, 15) industrial services come from refining old-fashioned services into service business. Manufacturing companies have had a tendency to add favors among products, which have been free for customers and have been a part of the product from the customer's view. However, over time these favors have refined to services, for which the customer is willing to pay for, because the customer believes it brings added value to their business. These kinds of services and renewing the business model form the basis of service business. Another way of looking at the development of industrial service business is to look at the manufacturing costs. According to Paavola (2013, 13), the manufacturing costs in Finland are so high, that it is essential for Finnish companies to have service business just to stay profitable.

Many definitions have been presented of industrial services (Schmitz, Gitzel, Hansjoerg, Setzer & Isaksson 2015). One definition presented by VTT (2016) is that industrial services are business to business -services, which are provided by corporations of the manufacturing industry and mainly consist of services revolving around the products, for example maintenance and installation (figure 1). Schmitz et al. (2015) have defined industrial services much like VTT, but continue to argue that some services may be only distantly related to the core products. Jackson and Cooper (1988, according to Schmitz et al. 2015) argue that industrial services can be defined as production services and that they are sold to industrial clients or clients with industrial production. Oliva and Kallenberg (2003 according to Schmitz et al. 2015) believe that industrial services are always an extension of products that the customer requires and that the customers do not always need to be industrial corporations. From these definitions the combination of VTT's (2016) and Schmitz, Gitzel, Hansjoerg, Setzer & Isaksson's (2015) definitions will be applicable to this thesis.

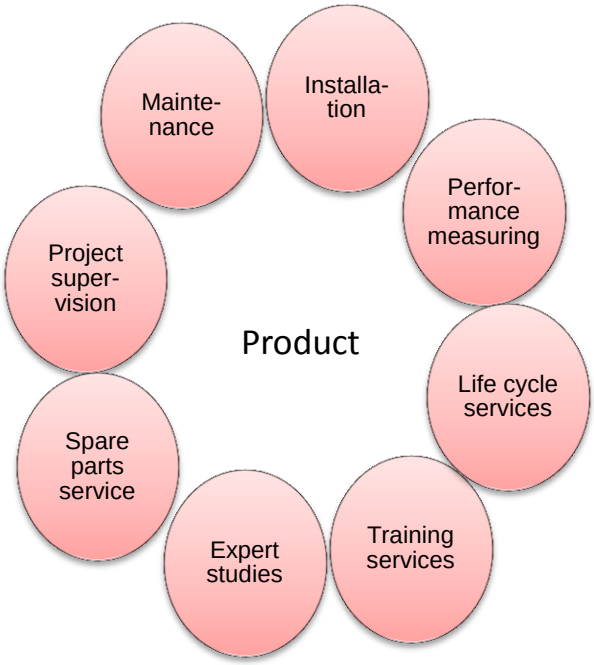


Figure 1. Examples of industrial services (Hyötyläinen 2007, 15; Martinsuo & Kohtamäki 2014, 9; VTT 2016)

Martinsuo & Kohtamäki (2014, 9) mention that some corporations have decided to view their services as a totally different independent business. To transform these services into service business it is required from the corporation to change their scheme of things into a more service-oriented way of thinking. This means that adding value to the customer should be in the focus of all functions. (VTT 2016.) According to Tekes (2010, 9) service business is often also called solution business. Since it is getting more normal to supply the products and services as a whole, otherwise known as hybrid offerings, sometimes it is more accurate to describe the service business as solution business, as it is extremely close to solution thinking (Arantola 2010, 35). Multiple companies, for example Kemppi, prefer to speak about solution business rather than service business, because of their solution centered way of thinking (Suutari 2013, 52).

In the center of service business is producing value to the customer. Malinen (2007, 88) notes out that understanding customer's business and defining customer's needs is more important in service business that in selling products. When selling products the customer relationship has

mostly been like a market relationship, in service business the supplier takes bigger responsibility than before on developing customer's business. Therefore it is important that the service provider understands customer's capabilities.

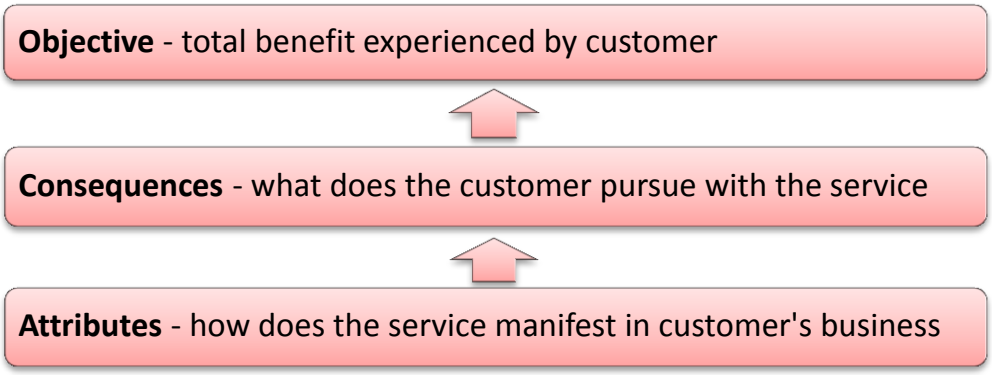


Figure 2. The creation of customer value (Huttu 2014, 18-19)

The main point of industrial services is understanding customer's value creation (VTT 2016). This means that the service provider must understand how the customer creates value and find a way to help in customer's value creation process. As depicted in the figure 2 above, customer value consists of attributes, consequences and objectives (Huttu 2014, 18-19).

Because the customer should be in the center of all functions when transferring from manufacturing products towards providing services, it is imperative to raise the conversation with the customer to a new level. By means of a deeper conversation digging into customer's needs is much easier and it is possible to find tailored solutions supporting customer's business. That is why services are not created in a vacuum or inside a factory; they are born in cooperation with the customer. (Ahonen et al. 2013, 29.)

Services are provided in cooperation with a value network, which is why it is important to recognize your own organization's customer value adding capabilities. These capabilities can be recognized with a value model. The base of the value model is understanding and defining the value of the customer and the customership, which enables one to recognize

customer's capabilities and own capabilities in relation to the customer. Once the organization has recognized them, it is possible to focus on how the members of the network can complement them. (Malinen 2007, 87-89.)

2.2 Service-dominant logic

To understand industrial services and new service development better, it is necessary to understand the concept of service-dominant logic. And for understanding the service-dominant logic correctly, the definition of service must be agreed upon (Lusch and Vargo 2011, 1301-1302). When talking about services in this subchapter, the thesis uses the definition from the forerunners of service-dominant logic, Lusch and Vargo (2011, 1302): "The application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself." They also emphasize that instead of "services" they use "service" because of the former's goods-dominant nature and the latter's focus on the process of serving (Lusch and Vargo 2011, 1307). Lusch and Vargo (2011, 1302) point out that this definition differs significantly from how service is usually defined in business. It is often that when defining service many talk about the IHIP's (intangibility, heterogeneity, inseparability and perishability) (Gummesson, Lusch & Vargo 2010, 15), categorized service industries where there is an absence of primary / secondary / extractive / manufacturing industry or that service is residual from goods (Vargo and Lusch 2004, 2; Lusch and Vargo, 1302).

In 2004 Vargo and Lusch introduced a new dominant logic for marketing: the service-dominant logic (S-D logic). Its central idea is that mutual service – service exchanged for service - is the fundamental basis of economic exchange (Gummesson et al. 2010, 10). S-D logic stresses that everything gets its value in use, as Zimmermann (1951, according to Vargo and Lusch 2004, 2) has stated: "Resources are not; they become". This is supported by Gummesson (1995, 250-51, according to Vargo and

Lusch 2004, 2) who states that the offerings a customer buys render services which create value. He believes that activities and things render services instead of services and goods being separate divisions. An example situation is buying a car; a few actually understands the technical qualities of a car and therefore are forced to rely on the brand. According to the S-D logic's definition of service, the quality of a car is seen as a variable and dependent on the way the customer creates value. (Gummesson et al. 2010, 16). The notion of separating goods from services is also dismissed by Lovelock and Gummesson's (2004, 28) belief that the IHIP's are not generalizable to all services. For example automation has notably reduced heterogeneity, and advances in information technology and telecommunications (e.g. the Internet) have made inseparability and perishability an option, not a rule.

Service-dominant logic has been described as a logic (Vargo and Lusch 2008, according to Lusch and Vargo 2011, 1304) and a perspective for seeing the economic and social world differently from goods-dominant logic, which represents "the traditional microeconomic and related marketing-management view" (Vargo, 2011, 4). Goods-dominant logic is not able to provide a complete comprehension of marketing and lacks an appreciation for the role of service. From goods-dominant logic service-dominant logic differs in that it puts intangibility, exchange processes and relationships into focus, whereas the goods-dominant logic holds tangible output and discrete transactions in the center. (Vargo and Lusch 2004, 2.)

Vargo and Lusch's (2015, 6-8) 11 foundational premises of S-D logic are presented in the figure 3. The 11 foundational premises represent the core basis of service-dominant logic, and have been revised and edited multiple times over the years to better reflect the S-D logic. Five of these foundational premises are considered as axioms of S-D logic (Vargo and Lusch 2015, 18), which are marked red.

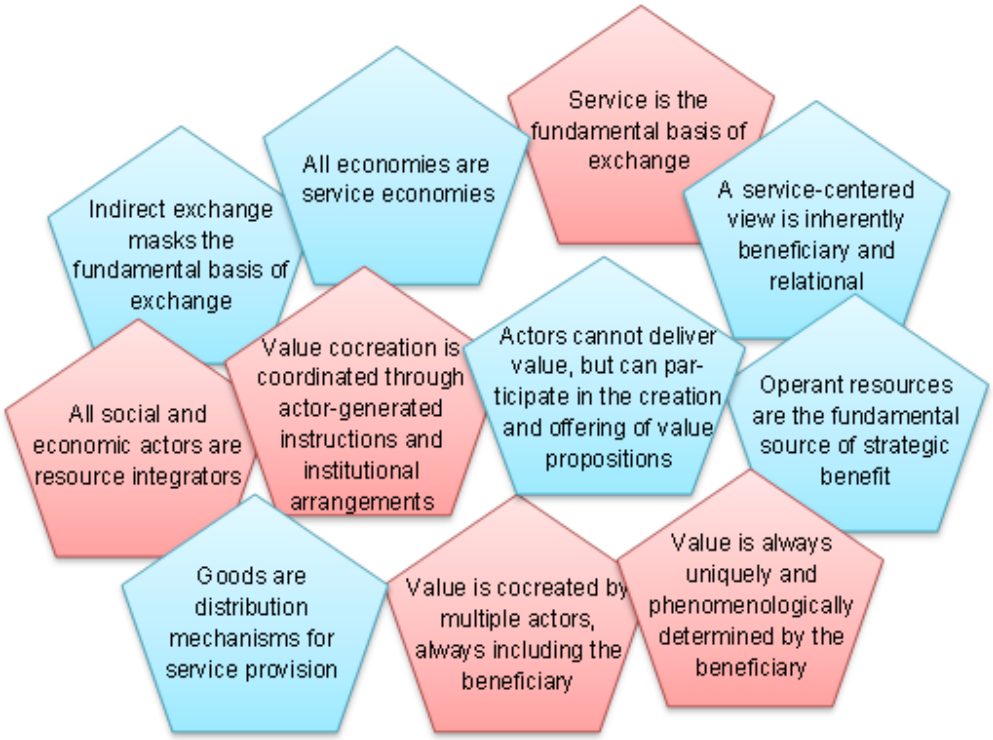


Figure 3: Foundational premises of S-D logic (Vargo and Lusch 2015, 6-8)

Lusch and Vargo (2011, 1303) argue that there are two main goals the S-D logic tries to reach; providing a better organizing framework for comprehending economic phenomena and being inclusive. S-D logic does not reject the role of the "good" or the economic theory's potential usefulness, but rather believes that the logic of service provision and value co-creation make goods and their usefulness more applicable and sensible.

2.3 Mass customization and modularity

When it was recognized that by producing standardized products or services it is not possible to gain superior returns anymore, it became necessary to gain a competitive advantage through customization (Kotler 1989, according to Kotha 1996, 442). Mass customization is a production process that combines mass production and tailoring (figure 4). Mass customization actualizes in a situation where products for customers' individual needs are manufactured cost-effectively with flexible production systems. (Ahoniemi, Mertanen, Mäkipää, Sievänen, Suomala & Ruohonen

2007, 16-17.) Through the correct management methods and advances in manufacturing and information technology, corporations are able to be flexible and responsive and therefore provide their customers with diverse and customizable products and services (The Economist 2009). With the mass customization model corporations are able to adapt the services and products according to customers' wishes without diminishing their profitability (Kotha 1996, 442).

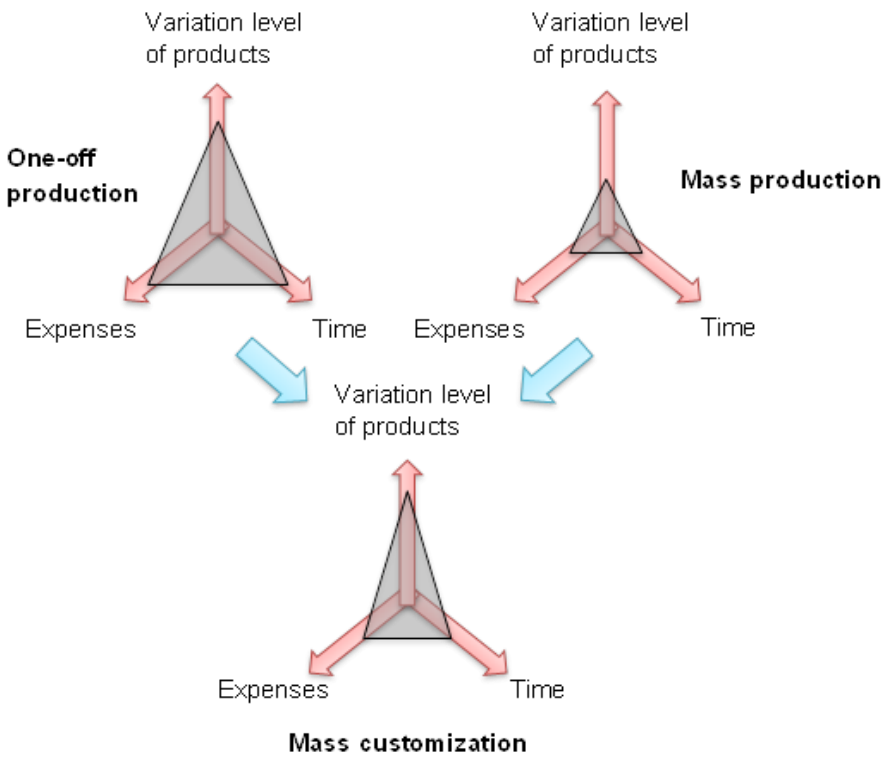


Figure 4. Mass customization combines the efficiency of mass production and the product variation level of one-off production (Ahoniemi et al. 2007, 17)

Kotha (1994, 589-590) emphasizes that when talking about mass customization, it is imperative to think of the company's strategy and whether or not mass customization is actually necessary. It is important to weigh the expenses and the profits going and coming from mass customization to see if it is a suitable method for the business. The tailoring costs can easily make the business unprofitable, which is why modularity, combining product structures, controlling product variations

and unifying processes are important factors in making mass customization profitable. (Ahoniemi et al. 2007, 23-24.) Another view comes from Kotha (1996, 447-449), who believes that to pursue mass customization successfully it is necessary to examine external and internal conditions. Internal conditions include investing to technologies and human resource development, having engineering expertise and manufacturing capabilities within own corporation, correct methods and culture for creating new knowledge and sustaining old one, marketing group that is able to excite the customers of personalization and factory's functions and competitive priorities need to be focused on mass customization. External conditions include being first in implementing mass customization in their own field, the industry needs to be facing increasing product proliferation, having supplier network in close proximity to reduce large inventories and inter-connected network for selected and trained retailers to communicate with the factory to reduce mistakes. Gilmore and Pine (1997, 95) believe that customizing the product is not the only way to do effective mass customization and presented that customizing the representation of the product can be just as effective. They emphasized that for successful mass customization the correct approach must be examined. For this, they developed four approaches for customization: transparent, collaborative, adaptive and cosmetic (figure 5).

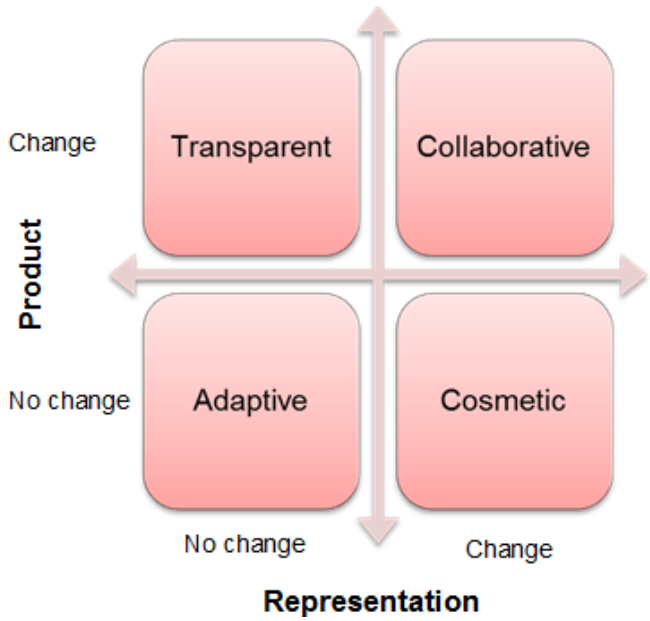


Figure 5. Four approaches to mass customization (Gilmore & Pine 1997, 95)

According to Kotha (1996, 444) the emerging literature usually emphasizes the differences between mass customization and mass production. It is important to remember that mass customization does not cancel mass production out, and in fact, they can be used side by side. For example the National Industrial Biking Company of Japan has used these two different approaches next to each other with great results. In this case, with mass customization and mass production the NIBC tries to tackle different segments. The NIBC has two different factories with two different purposes that circulate the knowledge between them and use different methods in their manufacturing. They have recognized that not only can mass production and mass customization work side by side, they can benefit each other as well. (Kotha 1996, 443-446.)

According to the Economist (2009), the limits where the customization is executed need to be defined precisely. These boundaries where in the customer is allowed to make changes help minimizing additional costs that can come from customization. From the service provider's point of view, the task of customizing for a particular customer should be delayed until the latest possible point in the supply network (Feitzinger & Lee 1997). Effective mass customization requires 3 principles:

1. The production process needs to be changed from a systematic process to units, which are adaptable to customers' needs and can be easily rearranged (Feitzinger & Lee 1997; The Economist 2009).
2. The supply network should be designed to be cost-effective, flexible and responsive to customers' orders.
3. The service should consist of independent modules that are easily assemblable into different forms of the service. (Feitzinger & Lee 1997.)

Modularizing services means creating service modules that have clearly defined barriers and that can be used in a number of different service

concepts by mixing and grouping them together. Service modules are the smallest part of the service that can be sold independently or as a part of a larger service supply. The service modules consist of different kinds of components, which are standardized tools and methods that are repeated often in services. (Ahoniemi et al. 2007, 40; Sariola & Martinsuo 2014, 68, 70.) With these service modules, managing services becomes a lot easier and more effective. Modular design gives the supply network the flexibility to customize products and services effectively, because the basic components can be assembled early on, modules can be made separately as well as at the same time and it is easier to discover and isolate quality problems. (Feitzinger & Lee 1997.)

There are two ways of approaching service module designing: by creating a module intentionally or by discovering possible modules. In this first approach a new service module is created, with the intention of it being usable in different service concepts. The second approach is to depict all of the current service concepts and recognize recurring and standardizable parts in them. (Sariola & Martinsuo 2014, 68.)

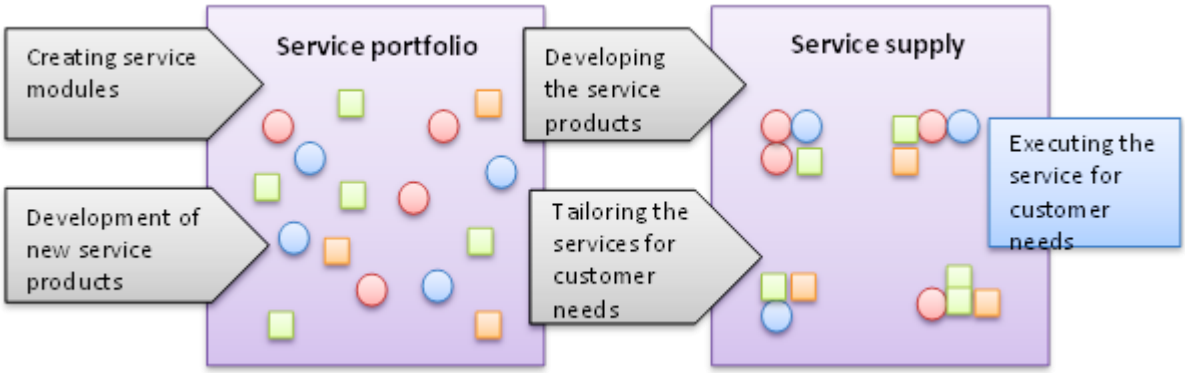


Figure 6. Management of service selection (Sariola & Martinsuo 2014, 68)

According to Sariola and Martinsuo (2014, 68) the management of service selection can be divided into two different perspectives: service portfolio and service supply (figure 6). The service portfolio is a selection of the service modules and components. Service supply is the entity consisted of all of the service concepts offered to customers. Through these service modules and components, services can be customized towards

customers' needs and corporations are able to standardize their services and modularize the service supply for the customer. (Sariola & Martinsuo 2014, 68-74.)

2.4 New Service Development

To create new markets or reshape old ones, new innovations are necessary (Berry, Shankar, Parish, Cadwallader & Dotzel 2006). Hybrid offerings, or in other words combinations of products and services are enabling the manufacturing companies to grow and compete (Ulaga & Reinartz 2011, according to Gremyr, Witell, Löfberg, Edvardsson & Fundin 2014). The manufacturing industry faces the challenge of inventing new technological solutions as well as constituting service strategies and implementing them through new service development and service operations (Gebauer et al. 2010, according to Gremyr et al. 2014). When discussing about new service development it is necessary to outline the concept of a new service. Fitzsimmons and Fitzsimmons (2000, 2) define a new service as follows:

> *A new service is defined as an offering not previously available to customers that results from the addition of offerings, radical changes in the service delivery process, or incremental improvements to existing service packages or delivery processes that customers perceive as being new.*

According to Tatikonda and Zeithaml (2002, 201) new service development (NSD) is an organizational process that combines marketing and operational capabilities together to create, design and implement a service valued by a customer. The NSD process can be described as a series of interconnected activities, tasks, actions and assessments that lead to a new service and its launch (Cooper et al. 1994, according to Bonomi Santos & Spring 2013, 802). The focus of NSD should be in creating new markets by innovating service provision (Berry et al. 2006 according to Gremyr et al. 2014) and by helping customers in value co-creation (Bettencourt and Brown 2013, according to Gremyr et al. 2014).

According to Berry et al. (2006), service innovation differs from product innovation in many ways. The three most noticeable differences are the participation of the service delivery staff in the customer experience, decentralization of production capacity dictated by the physical presence of the customer and the lack of a tangible product. In contradiction with the previously introduced S-D logic, Alam and Perry (2002, 515-516) believe that services differentiate from products by five factors: intangibility, heterogeneity, inseparability, customer involvement and perishability. Because of the differences in these factors new product development (NPD) model does not apply to services. They also believe that because of the lack of strategic focus on development competencies and NSD, new services often fail. The figure 7 below presents industrial service's innovation process and depicts the differences between innovation a service and the innovation process of a product. The customer clearly has an emphasized role in all stages of the service innovation process compared to the innovation process of a product. (Salkari, Hyötyläinen, Apilo, Ryynänen & Korhonen 2007, 66.)

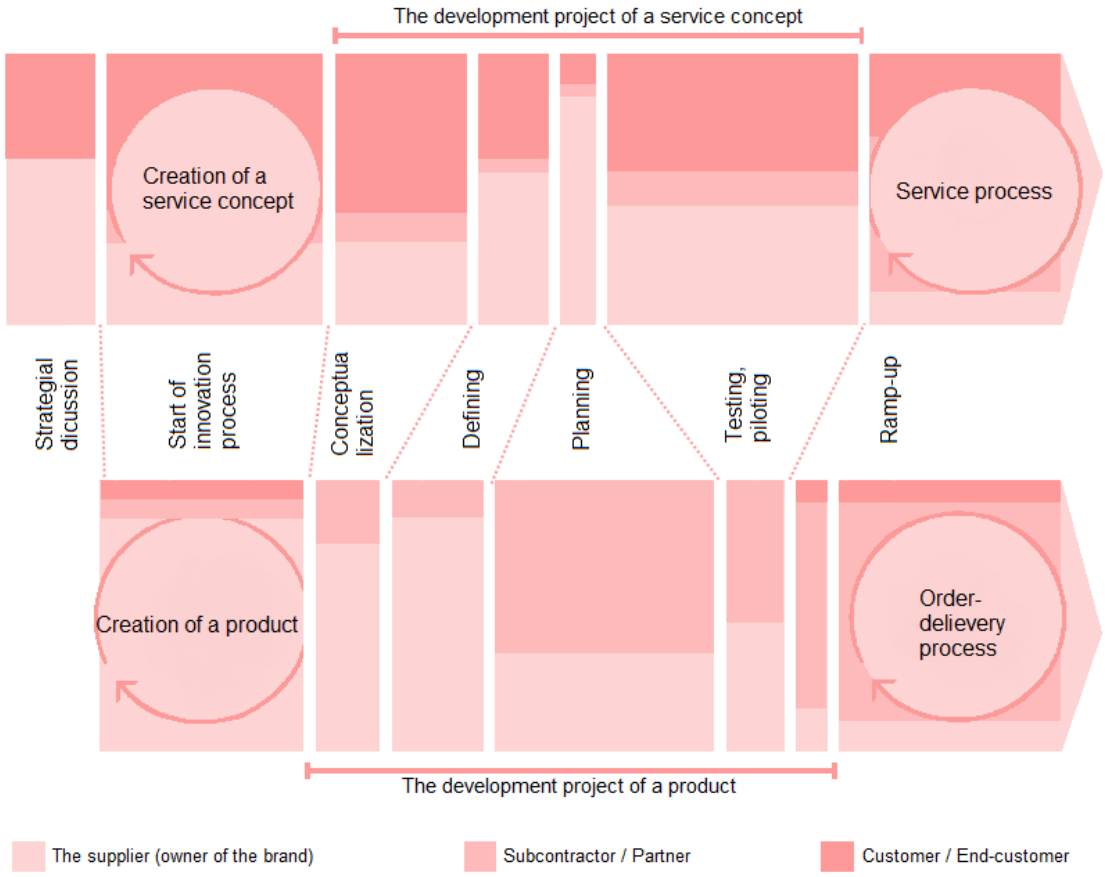


Figure 7. The innovation process of a service and a product (Salkari et al. 2007, 66)

Gebauer et al. (2006, according to Gremyr et al. 2014) have divided the NSD process into three stages: identification the needs of the market, development of new services and introduction to the market. Bonomi Santos and Spring (2013, 802) also propose a more conceptual three-stage model composed of emergence, accommodation and consolidation. Kindström and Kowalkowski (2009, according to Gremyr et al. 2014) have identified four stages from the NSD process: market sensing, development, sales and delivery. Both of these processes are consistent with NSD research in service corporations, in that the processes have fewer stages than an NPD process. An older but more a comprehensive interpretation is provided by Alam and Perry (2002, 524), who recognized ten stages throughout which services are developed. These stages are depicted in appendix 1 in a linear and a parallel model. The linear model is generally used by bigger organizations and the parallel model is more common to smaller organizations. In the parallel model some of the process phases overlap, and the decision of dropping or continuing with the development of the service is not done after every stage like in the linear model. (Alam & Perry 2002, 522, 525.)

2.4.1 Customer journey map and user profiles

For comprehending an existing service or a new one, customer journey mapping is a useful tool. A customer journey map (figure 8) is a story that depicts the steps that a customer goes through when using a product or a service (Richardson 2010). It can focus on a determined part of the service or the experience as a whole (Boag 2015). The customer journey map consists of a timeline, actions, motivations, questions and barriers, all illustrated from the customer's perspective (Richardson 2010).

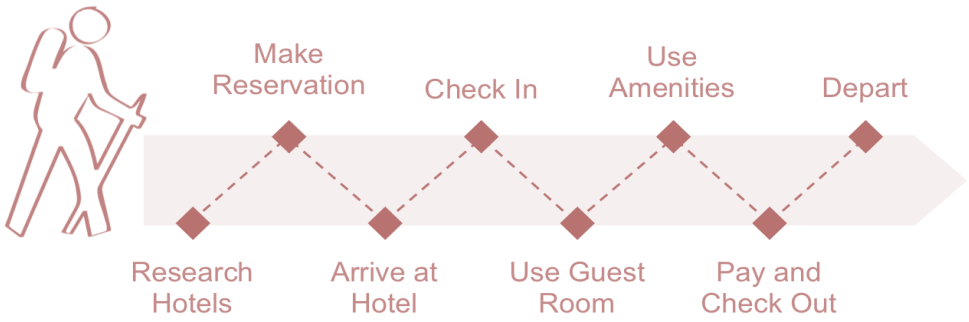


Figure 8. An example of a simple customer journey map (Abraham 2013)

A customer journey map is used for understanding the customer's emotions across touchpoints of a service. With a customer journey map it is easier to identify complications in the touchpoints of the service from the perspective of the customer. It can be used to develop an existing service or to design a new one focused on the customer's experience. For developing an existing service, the current state of the service should be depicted in a journey map to understand the touchpoints and problems in the service. It also helps in identifying causes to the problems, improving current service's efficiency, providing a better customer experience, understanding how customers behave and developing metrics for achieving objectives. When designing a completely new service, the future or ideal state should be illustrated in a journey map to picture the service better and to plan the functions of the service. Customer journey mapping helps in defining the service, identifying the necessary infrastructure, planning the required staff and developing empathy for customers. (Curedale 2016, 38-39.)

Lord (2013) has identified six practices that should be considered when making a journey map:

1. Create customer personas

2. Create customer stages: the step-by-step experience of the customer

3. Understand your customers' objectives

4. Identify touchpoints of the service

5. Gather data and define a time frame

6. Define who should fill the gap between customer needs and service offerings

Cooper (Curedale 2016, 51) defines customer personas (also known as user profiles) as characters that are made to represent a whole group of users. The personas are presented as individual humans, but they are not actual people. Customer personas help to create empathy for users and are a useful tool for analyzing and understanding users instead of guessing. The personas should be based on real data collected for instance through observation and interviews. The users should be segmented in groups based on their commonalities and personas created accordingly. Personas should be different from each other and stereotypes as well as extreme characteristics should be avoided. (Curedale 2016, 51.)

Picture 3. An example of a customer persona (Presentationload 2015)

When creating a persona, it should be realistic (picture 3). The persona should have a name, a photo and demographics should be defined. Persona's goals, motivations, frustrations, favorite brands and

characteristics should be defined to understand the persona. (Curedale 2016, 52.) Depicting customer personas this way help making them more real and understandable for all employees (Presentationload 2015),

2.4.2 Service blueprint

Because of the tangible nature of services, they are often tricky to conceptualize and visualize in development. Service blueprint can give a better comprehension of the services and their fundamental processes. (Seyring, Dornberger, Suvelza & Byrnes 2009, 4.) Service blueprint (figure 9) is a flow chart that used for visualizing the design of a service process. It is a service design tool for sketching the steps that a customer or the designer will go through to establish the aim of the design. (Katzan 2015, 4.) Service blueprint contains the customer journey and all of the interactions that are necessary for completing the journey (Ross 2014), but it differs from customer journey in that it depicts the service or experience delivery process as a whole including the things that the customer cannot see (Curedale 2016, 38-39).

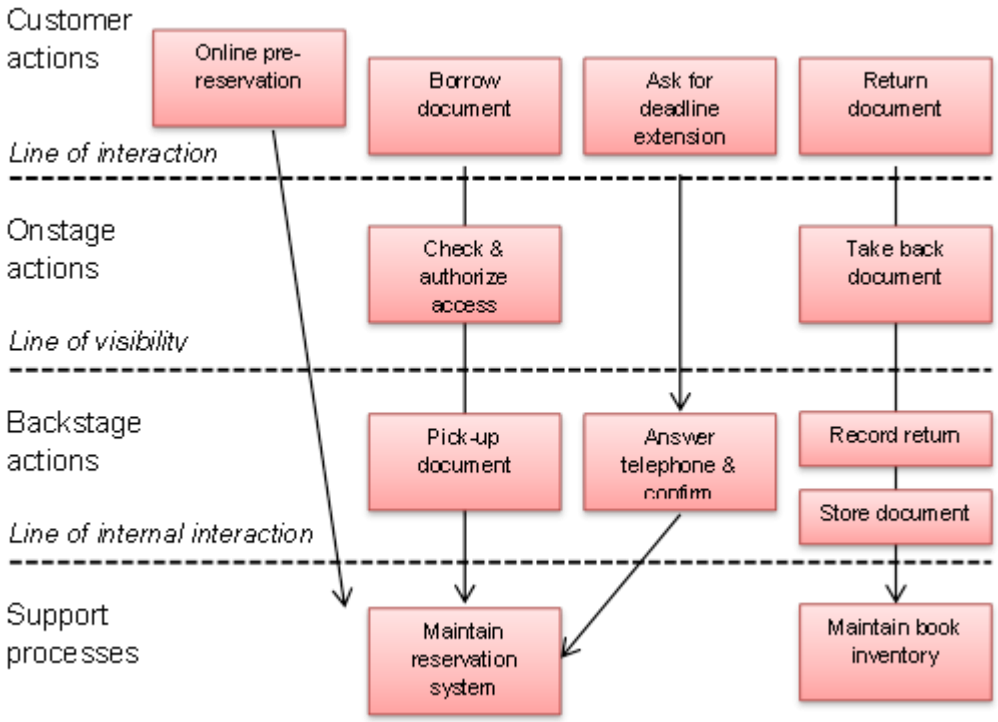


Figure 9. An example of a simple service blueprint (Pigneur 2008)

Service blueprints can be used for developing new services or improving extant services (Seyring et al. 2009, 4). They are usually used to identify provider interactions, problems in the service and the parts of the service that the customer can see (Katzan 2015, 4). Service blueprints are also used for clarifying the interactions between users of the service, touchpoints and service employees that influence the service visibly and invisibly. In other words, service blueprinting helps coordinating complex services and understanding how they work. Service blueprints should be used e.g. when it is unclear how a service gets produced, when there are multiple players involved or when improving service offering. (Ross 2014.)

According to Seyring et al. (2009, 4-10), before blueprinting a service, the objectives of the service blueprinting process should be understood by all participants. Then information of client requirements, processes and sub-processes of existing services, related resources and duration of the processes should be gathered. After these the service blueprinting process can begin by identifying dividing lines and swimlines. The service blueprinting process for new services (figure 10) differs from the service blueprinting process for existing services (figure 11) in that in a new service blueprint is depicted the optimal course of the client where as in an existing service blueprint the service is depicted as is to discover real glitches.

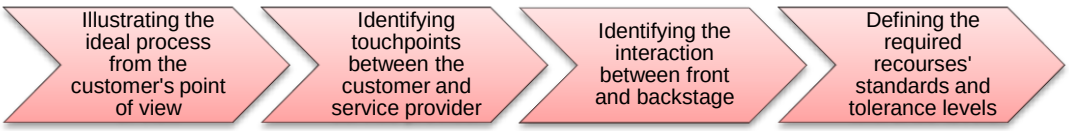


Figure 10. New service blueprinting process (Seyring et al. 2009, 7)

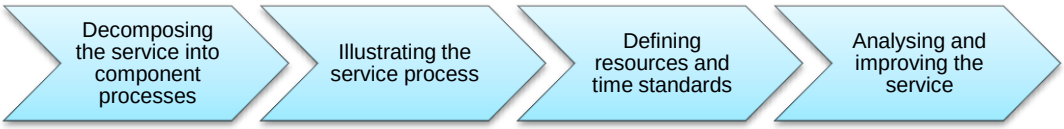


Figure 11. Existing service blueprinting process (Seyring et al. 2009, 10)

Service blueprinting is based on dividing the service into separate processes (Seyring et al. 2009, 5). Ross (2014) divides the service blueprint (figure 9) into two main elements: dividing lines and swimlanes of information. The dividing lines are the line of interaction, the line of visibility and the line of internal interaction. Between these dividing lines there are five swimlanes that present the basic points of the service: physical evidence, customer actions, frontstage (everything required by the service that the customer can see), backstage (everything required by the service that the customer cannot see) and support processes. Along with these Ross (2014) recommends some additional swimlanes such as time and emotional journey.

The most important aspect of industrial services is creating value to the customer (VTT 2016). Service-dominant logic also emphasizes value due to their belief that everything gets its value in use (Zimmermann 1951, according to Vargo and Lusch 2004, 2) and that the products a customer buys render services which create value (Gummesson 1995, 250-51, according to Vargo and Lusch 2004, 2). Mass customizing helps in value creation by giving the customer a sense of uniqueness (Ahoniemi et al. 2007, 17). The NSD process emphasizes the customer’s role in service development (Salkari et al. 2007, 66), which can be illustrated by customer journey mapping (Richardson 2010), user profiles (Curedale 2016, 51) and service blueprinting (Seyring et al. 2009, 4).

3 DIGITAL LEARNING

Information changes all the time. Knowledge needs to be updated regularly, to keep up with the rest of the development. Work life is becoming more international by the minute, and there needs to be more means to manage it. (Niemi & Multisilta 2014, 17-28.) Corporations demand more and more workplace knowledge and professional competence from their personnel. With the increase in workplace diversity, employers have noticed the need to improve their employees' capabilities. (Cheng & Chen 2015, 212-213.) Technical appliances have been instrumental in connecting people around the world and easing people's lives by concentrating many different things into one place (Niemi & Multisilta 2014, 17-28). eLearning is becoming highly popular in the twenty-first century because of employers' demands on competence, digitality, eLearning's cost effectiveness and rapid development compared to traditional training. (Cheng & Chen 2015, 212-213).

The manufacturing industry has adapted a network perspective to their products and processes. Now known as industrial internet, it consists of three things: smart machinery, advanced analytics and humans at work. (Evans 2012, according to Juhanko, Jurvansuu, Ahlqvist, Ailisto, Alahuhta, Collin, Halen, Heikkilä, Kortelainen, Mäntylä, Seppälä, Sallinen, Simons & Tuominen 2015, 10-11.) All of these are connected to each other through the internet to provide information and to make processes and products more effective (Juhanko et al. 2015, 10). Industrial internet causes a steep learning curve for industrial employees, which is why training and keeping up with the latest updates becomes more essential. This requires the perfect LMS for eLearning, which enables corporations to train their employees continuously and to keep up with the best practices and latest trends. (Katchi 2016.)

In this part of my thesis I will be focusing on digital learning. This chapter is divided into three parts: eLearning, learning management system and usability. I will look at the subjects from a service development point of view without focusing on the educational part of digital learning.

3.1 eLearning

According to Staffans (2011) the teaching service network is created together with the school, its partners and learners. Together they can create a classroom wherever they want, whenever they want. In the future, the classroom can be just about anywhere and the facilities serve just as the intermediary of experiences and meanings. In the figure 12 the differences between traditional and more futuristic facilities are represented. The figure 12 and the statement both speak on the behalf of eLearning, as eLearning is not tied to a single geographical location or time. It is informal, global, virtual and scattered, and requires only the school, partners and learners.

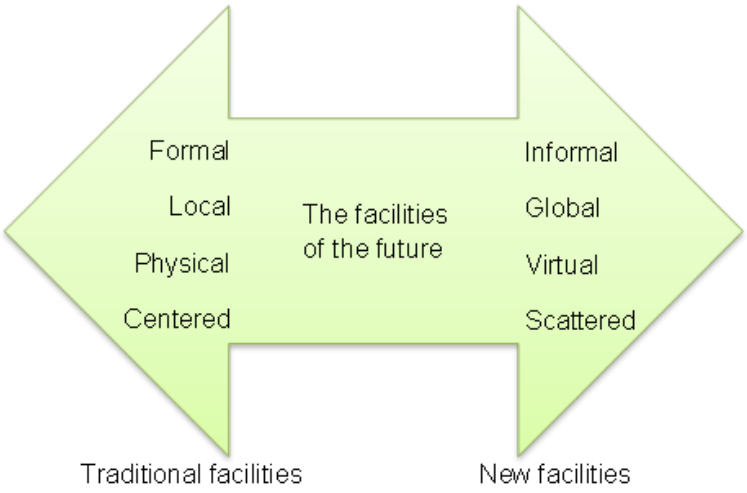


Figure 12. The school of tomorrow (Staffans 2011).

eLearning (electronic learning) is a learning process that is created by digitally delivered content, services and support (Raju, Vijayalakshmi & Showmya 2011, 1584). The purpose of eLearning is to enhance corporation's employees' training (Chang & Chan 2015, 223). Because of eLearning's network based nature, it can be accessed by anyone, at any time, from anywhere and with any device (Zhao 2011, 139). This eases especially the training in international companies who have employees in different countries and companies whose employees do shift work. With eLearning, corporations are easily and effectively able to train their

employees' ability, broadcast the corporation's policies and extend their services. (Chang & Chan 2015, 212-213.) For these purposes there are many different LMSs and tools on the market, e.g. Moodle (Moodle 2015), Totara (Totara Learning 2013), Docebo (Docebo 2016) and Adobe Connect (Adobe Connect 2011).

The center of eLearning is designing the students' operations: what the students need to do to achieve the learning objective (Pruikkonen 2012a, 15). In line with "Etäopetuksen lumo" study discussed by Pruikkonen (2012a, 19), there are at least three skills required from a student in distant learning: belief in the impressiveness of own actions, taking responsibility from own learning and self-regulation skills. ICT skills are important as well, as it has been proven that they have an effect on success in eLearning. Contrary to many beliefs, online learning requires interaction and communal activities just like normal education (Pruikkonen 2012b, 9). The study pointed out that eLearning solutions which combine multiple different forms of interaction work the best. There are many other matters as well to take into consideration when designing eLearning, for example giving student a clear course plan, which entails the instructions of what, where and how everything will be done, as well as when and with whom (Pruikkonen 2012a, 15). In the figure 13 below are gathered the elements necessary for creating a good online education experience, that teachers have pointed out during interviews conducted by Pruikkonen (2012a, 17) and Anttila.

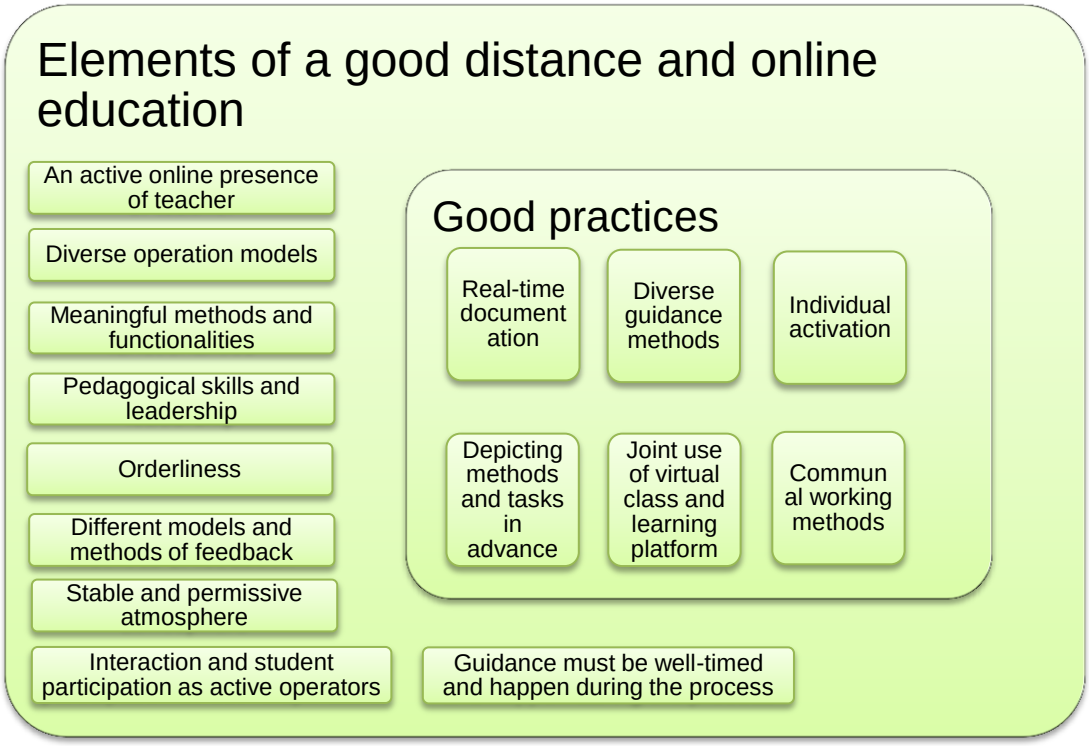


Figure 13. Elements of a good online education (Pruikkonen 2012a, 17)

Elmoawe Dreheeb, Basir and Fabil (2015, 16-18) discovered that the top three attributes common to all researched eLearning quality models were usability, reliability and efficiency. These attributes have an effect on the system quality and system quality has a significant influence on user satisfaction, which again has an effect on user's intention to use the eLearning system. This process is illustrated in figure 14 for better comprehension. The findings from Elmoawe Dreheeb et al. advocate other studies which have (according to them) shown that there is a positive relationship between user's satisfaction and continued intention to use eLearning.

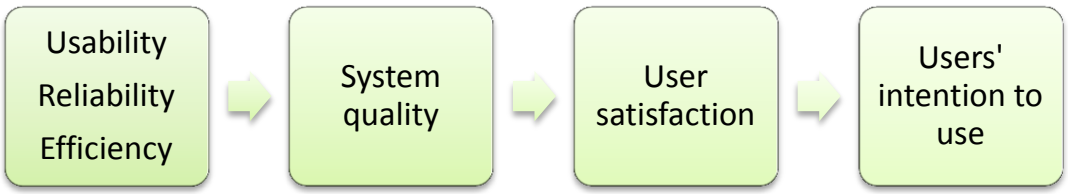
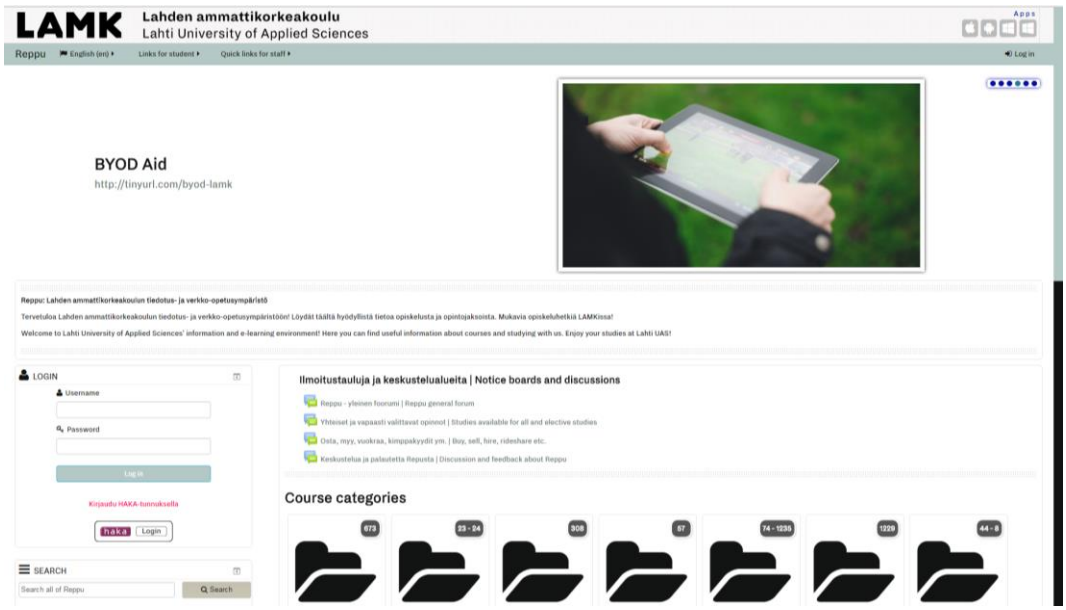


Figure 14. Relationships between attributes and users' intention to use (Elmoawe Dreheeb et al. 2015, 15-18)

3.2 Learning management system

Chung, Pasquini & Koh (2013, 26) believed Simonson's (2007) definition of learning management systems (LMS) has been the most accurate this far, when he stated that learning management systems (also known as course management systems and virtual learning environments) are software systems that are constructed to help managing educational courses. They make administrating courses easier for teachers and learners, and often track the learners' progress. LMSs can be used as a primary tool for distance education or to support traditional classroom learning. Providing an environment for learning and teaching with great availability regarding time and distance is one of the key elements of LMSs (Epping 2010, according to Chung et al. 2013, 25). They are usually used to manage eLearning in the business and education sectors (Bridge 2016). Examples of learning management systems are Moodle (2016) (picture 4), iSpring Learn (iSpring 2005-2016), Blackboard Learn (Blackboard 1997-2006) and Docebo (2016).



Picture 4. An example of a front page at Moodle (Lahti University of Applied Sciences 2016)

Purpose of the LMS is to make learning and teaching easier by e.g. delivering, tracking and reporting on the online course's content. LMS

provides a centralized location and a collaborative platform for learning and training content. (Bridge 2016.) Usually LMSs offer teachers and learners multiple tools for presenting and organizing course content, communicating, assessing students (for example via grade book) and various other functions. (Chung et al. 2013, 27.) For corporations, LMSs can help HR and management to monitor the progress and goals of employees. LMSs can make learning and teaching more effective and flexible and they are evolving continuously. (Bridge 2016.)

Studies listed by Dağhan and Akkoyunlu (2016, 199) have shown that in LMSs, instead of the shot-term usage, should be focused upon the continuance usage behavior, since it is essential when designing and implementing an LMS (Terzis, Moridis & Economides 2013, 50). According to their study (2016, 207) the quality of information, system and service has a significant effect on the satisfaction of eLearning environment usage which predicts intention in continuance. Alongside with these three criteria for measuring the quality of an LMS, Lin (2010, 878) proposes a fourth criterion: attractiveness. He continues to argue that the quality of information should be high and improved regularly to increase the usefulness of the website. For unexperienced online learners the information should be clear and more detailed. To satisfy experienced learners' information needs, the information quality should be high and the usefulness of courseware should be highlighted. For potential online learners, the design of the LMS should be visually appealing, tidy and easy to use. (Lin 2010, 887.)

What makes a good LMS? It is important to find the LMS that offers the features that are needed and wanted by the buyer. Laskaris (2014) has introduced eight features for a good LMS page: universal format upload button (all file formats should be accepted by the LMS), international standard compliance (LMS should be compliant with all course formats), star features of an LMS (e.g. reporting, discussion and mobile support), easy to use and easy to understand, multiple reporting formats, unpredictable audiences, budget blues (reasonable price) and LMS

hosting and support. Rojas (2016) presents a shorter list based on her own experiences for designing a better LMS: focusing on data, designing for usability and planning for mobile. She believes that it is important to know what kind of data is desired from the users and then make it easy for the users to give the data. Since mobile users are increasing, designing the LMS for mobile is becoming more important; so important in fact that Rojas believes that designing for mobile should be the first priority. Access by mobile is also presented by Fenton (2016) who has listed 13 features which he has used in assessing different LMSs. These features are: price, PCMagazine's editor rating, setup fee, SCORM import, bundled course content, Instructor-Led Training (ILT), support, Google Apps integration, Single Sign-On (SSO), e-commerce, developer API available, gamification features and mobile access. He also emphasizes on deciding whether you need an LMS designed for the educational or corporate market. Fenton (2016) also states that these features alone cannot assess what is the best LMS for a specific company, since it is very much dependent on corporation's needs and budget. Chung et al. (2013, 28) present that HCI (Human-Computer Interaction) should be taken into consideration in an LMS. For a high quality LMS, the five categories of HCI should be regarded: transmitting course content, assessing students, assessing course and instructors, creating class discussions and creating computer-based instruction.

3.3 Usability

The International Organization for Standardization (ISO, 1998) has defined usability as: "Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." Reiss (2012, xvii) agrees with this definition and adds that usability also extends to immaterial services. He continues by saying that usability is related to user's situational needs and that user's satisfaction has an effect on the quality of the usability.

Nielsen (2012) has broken usability down to five components: learnability, efficiency, memorability, errors and satisfaction. He believes that these are the most important quality attributes that define usability. Reiss (2012, xviii) on the other hand has divided usability into two sides: ease of use, and elegance and clarity. Ease of use entails the physical properties like functionality, responsiveness, ergonomics, convenience and fool proofing the product or service. These properties ensure that a product/service does what the user wants to happen. Elegance and clarity focuses on the psychological properties of a service or a product, for example visibility, intelligibility, logic, consistency and predictability. The purpose of thinking about elegance and clarity is to make sure that everything happens the way the user expects it to happen. (Reiss 2012, 1, 109.) However, Thurow (2014) emphasizes that usability is not the same as user's opinion. She believes that the main characteristic of usability is task completion, which then has a strong effect on user satisfaction.

Usability is considered important because of continuity; if someone uses a product or a service and it works well, the user will be more likely to use it again. For example if a dishwasher breaks down and the repair service is perceived bad, the user is not likely to buy any other products from the dishwasher company again, and is more likely to shift towards competitor's products. Usability affects everyone and must be acknowledged by every corporation. (Reiss 2012, xix-xx.) The same applies to websites: Nielsen (2012) states that if a website has not considered usability and executed it well, people leave the website immediately. People do not want to think too hard when they are using a website (Redwood 2015).

3.3.1 User research and usability testing

According to Curedale (2016, 4) corporations that focus on optimizing the user experience perform drastically better than those who do not. That is why a big part of designing usability is doing user research. Goodman, Kuniavsky and Moed (2012, 3) define user research as the process of trying to comprehend how people construe and use products and services.

It is necessary for figuring out what is usable, useful and successful and recognizing what is not going to be profitable. It is also a good way to gain information for improving a product or a service, even after they are launched. A good example of how user research can have an effect on success is Lego Group; they did well in the 80's and 90's, but found themselves struggling in the 2000's. They realized that they did not understand anymore what their customers wanted, and by doing user research they effectively turned their company around. User research can be performed for example by conducting interviews, usability tests, observations and surveys. (Goodman et al. 2012, 3-9.)

As user research is done with users in focus, usability testing refers to methods that assess a product or service by testing it with a small group of its users (U.S. Department of Health & Human Services 2016). With it corporations are able to see whether the users can use the product or service (Goodman et al. 2012, 11). Usability testing is a good way for identifying problems before they are hidden completely (U.S. Department of Health & Human Services 2016). It has two main goals: receiving the most natural answers as possible and receiving the most complete responses as possible (Goodman et al. 2012, 296). During usability tests it is possible to e.g. measure user satisfaction and analyze product's/service's performance (U.S. Department of Health & Human Services 2016).

Goodman et al. (2012, 273-275) believe that usability testing should not be the only way to measure an entire user experience with a product or service. They advise doing it in the middle stages of the development process to gain its advantages in the version under development. Peacock (2010) states that usability testing should be done continuously, as user behavior can change over the years. It can be done officially, for example through focus groups, or unofficially, for instance by receiving feedback from users via Facebook.

Goodman et al. (2012, 273-275) have divided usability testing into four types: exploratory, assessment, comparison and validation. The first type,

exploratory, is to test preliminary concepts and assess their likeliness. Assessment is about testing features during commissioning and comparison refers to comparing designs against each other. Finally, validation certifies that the features meet the standards and benchmarks required. Usability testing can be done for example by eye tracking, interviews and observing task execution (Goodman et al. 2012, 12-13, 296-313).

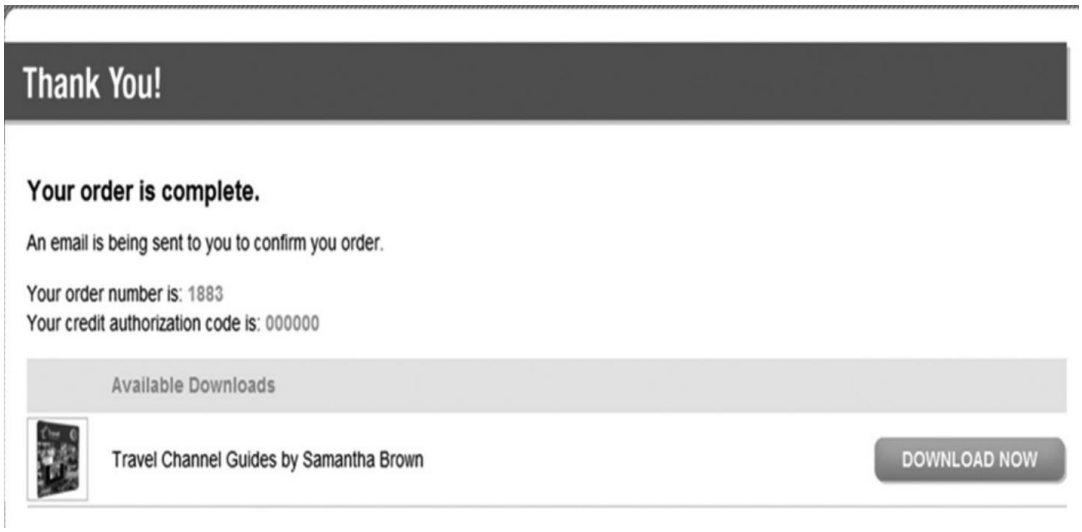
Travis (2016) has created a usability test plan dashboard to be used as a tool for designing a usability test, which can be implemented as a checklist to remember all required parts of the testing (appendix 2). The dashboard is short, easy to do and people will more likely read it than a bigger document. It includes descriptions of the product or service under test, business case, test objectives, participants, test tasks, responsibilities and procedure.

3.3.2 Human-Computer Interaction

Software has long been assessed only by its availability, functions and algorithmic efficiency. The development of technology has resulted into software being harder and harder to assess by the technological qualities, and therefore the user experience has risen as an important quality factor in technology research. (Kim 2015, ix.) Human-computer interaction (HCI) studies people's interaction with computers and whether or not and to what extent computers are developed usability in mind (Rouse 2005). HCI covers the theory, design, implementation and evaluation of the means that people use and interact with computing devices (Kim 2015, 1).

According to Kim (2015, 2) there are four objectives that a good HCI should pursue: functional completeness, compelling user experience, aesthetic appeal and high usability. High usability refers to the interface ensuring safety, being easy to use and effective for the task and that it leads to a correct completion of the task. To achieve these goals Kim (2015, 3-11) has presented in his book the seven principles of HCI: know thy user, understand the task, reduce memory load (less stimulation for

user's short-term memory), strive for consistency, remind users and refresh their memory (picture 5), prevent errors/reversal of action and naturalness.



Picture 5. Reminding users after a transaction (Kim 2015, 10)

How does HCI work in practice? Let's look at this through the seven principles of HCI. *Know thy user* refers that both the interface and interaction should be designed to meet the needs and capabilities of the user. The information of the user should never be guessed, they should be collected via user research methods. With a straight relation to knowing thy user, *understand the task* refers understanding the task that the user is supposed to accomplish by using the interface. To *reduce memory load* the interaction should be simple, and the interface cleaned from additional clutter. Since human's short-term memory can hold only 5-9 chunks of information, many applied this knowledge to interface design and kept the number of many items under this amount. One way to diminish the burden of the short-term memory is to keep the interface consistent. A good example of *striving for consistency* are Microsoft Windows-based applications, such as Word and Excel, where the functions may change but the basic layout stays the same. To r*emind users and refresh their memory* many use receipts and order confirmations. These kinds of closures bring satisfaction to the user by matching user's mental picture of the process. To *prevent errors/reversal of action* a good way is to present only the relevant information required at that time. Still, mistakes happen

so it is important to have a clear and easy way to reverse an action. The last principle, *naturalness,* requires the interface reflecting the operations that are common in user's everyday life. For example a natural language-based conversational interface would make the perfect HCI, as it imitates how people communicate with each other. (Kim 2015, 3-11.)

Industrial internet causes a steep learning curve for the employees in the manufacturing industry. The employees require more training to keep up with the development. (Katchi 2016.) For training employees, eLearning is a great tool (Chang & Chan, 223) through which the training can be delivered through one system but accessed by anyone, at any time, from anywhere and with any device (Zhao 2011, 139). Learning management systems are designed to enable and manage eLearning (Bridge 2016). LMSs can be used as a primary tool for distance education or as a secondary tool supporting classroom or practical education (Simonson 2007, according to Chung et al. 2013, 26). There are many definitions of the most important qualities of a good LMS (Laskaris 2014; Rojas 2016; Fenton 2016; Chung et al. 2013, 28), and most of them agree that usability is an important feature of a good LMS (Laskaris 2014; Rojas 2016; Chung et al. 2013, 28). Usability refers to users' ability to accomplish specific tasks and is important because of continuity; a product or a service will only be further used if its use has been found easy (Reiss 2012, xvii-xx). A big part of usability is user research (Curedale 2016, 4) and usability testing (Goodman et al. 2014, 273). Human-computer interaction is also a big part of usability as it studies people's interaction with computers and whether or not and to what extent computers are developed usability in mind (Rouse 2005). Service blueprints and customer journey mapping are a good way of locating problems in usability and enhancing the user experience (Curedale 2016, 9).

4 THE PROCESS

This thesis is an operational thesis. According to Salonen (2013, 5-19) operational thesis is always a development project (Figure 15). It always consists of a development project report and an outcome that is made by the student. The purpose of an operational thesis is to develop student's reasoning and professional skills, so that the student is able to produce these kinds of projects in working life as well.

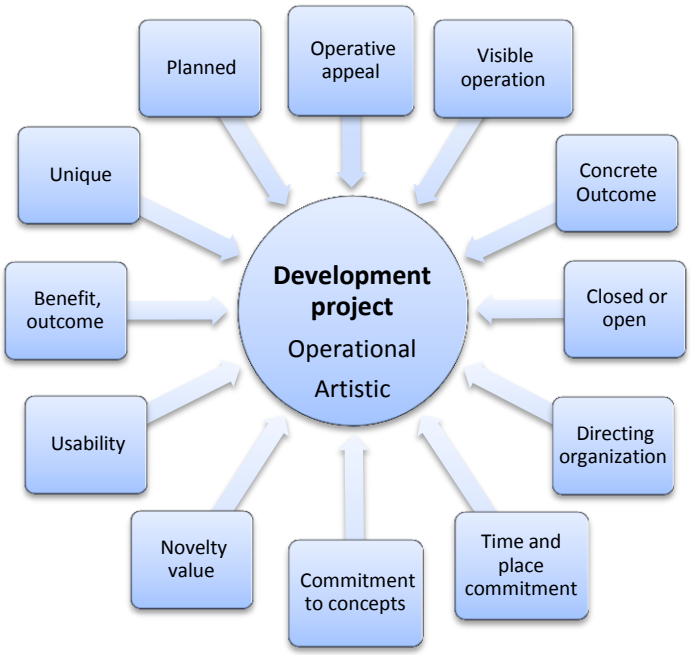


Figure 15. Main characteristics of a development project (Salonen 2013, 13)

The operational thesis process follows the same steps as development project process (Figure 16), which entails careful planning, phasing the project, learning in action, complicity, research oriented grip and diverse understanding and control of methods (Salonen 2013, 17-19). According to LUAS's (2015) criteria for a good operational thesis, the methods and sources used for the research oriented phase must be well thought out, explained, analyzed and justified.

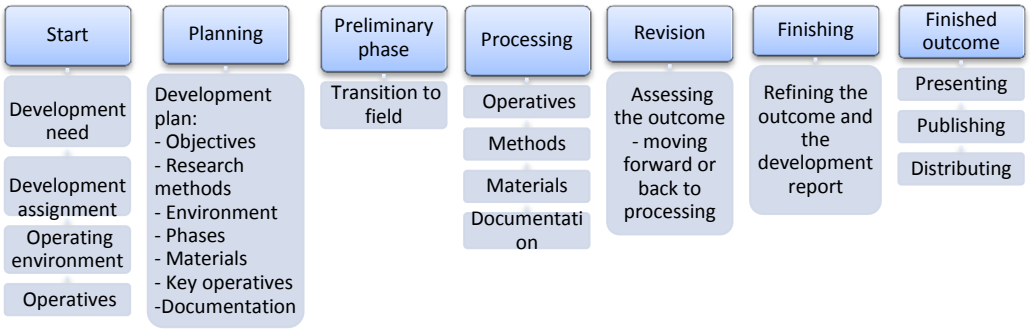


Figure 16. Development project process (Salonen 2013, 17-19)

In this chapter the process behind the output of this thesis is introduced. The methods used for collecting information and the ways that those methods were implemented in this thesis are explained. First the process of this thesis will be explained through the NSD model. Second, the observation method is presented, which was used in this thesis to gather specific information about the users and their working facilities. Then the process of evaluation and selection of the most suitable LMS will be brought forth. In the end pilot based development and the eLearning pilot are introduced.

4.1 Thesis process

Alam and Perry's (2002, 525) parallel model of a development process was followed in two ways; in the development of the eLearning service and in the thesis process. Since this thesis is by a single author, the parallel model was more appropriate than the linear model (figure 17). The process started by *searching an employer and ideas* for my thesis. These overlapped clearly because the thesis needed to be valuable for the employer and the employer needed to be someone who had the same general ideas for the thesis. This was the point where ideas *were killed* as either there was no employer or the idea was not good enough for this thesis. After finding an employer and a subject, the subject of the thesis needed to be *specified*. An important part of this was to conceive *which subject would bring most value* for the employer and the field. The

specifying happened between the author and the employer as well as between the author and her teacher.

When following Alam and Perry's (2002, 525) model, step five is *forming a cross-functional team*. In this case it means being in contact with author’s teacher and employer, who form a team that gives guidance, boundaries and information. This step differs a bit from the model, since the teacher has provided guidance from the start of this process and the employer has guided the process from early on as well. *Information was gathered* from books, internet and the users to understand the theory and users' perspective better. Then the findings were *documented* on written form to this thesis so that the gathered knowledge would benefit others as well. *Service design tools* – service blueprint, customer journey map and user profiles – *were used* to illustrate the final service better. Then *the outcome of the thesis* needed to be made as well as finishing touches. Last part of the thesis process was *publishing* the findings, which happened in 3 parts: first the thesis was presented in the thesis seminar, afterwards uploaded to Theseus.com and lastly the findings were presented to the employer.

Even though the purpose of this thesis was to develop a new service, there were some points in the parallel model that did not fit for the process. Stage four, business analysis (Alam and Perry 2002, 525), is usually when the service's finances are taken into consideration, but this thesis does not present a financial review. As mentioned before, forming a cross-functional team in stage five was not a separate action in the middle of the process; it happened early on and overlapped with other stages. Some of the go/kill stages were unnecessary, since the point of this thesis was to design the service, not to assess its profitability.

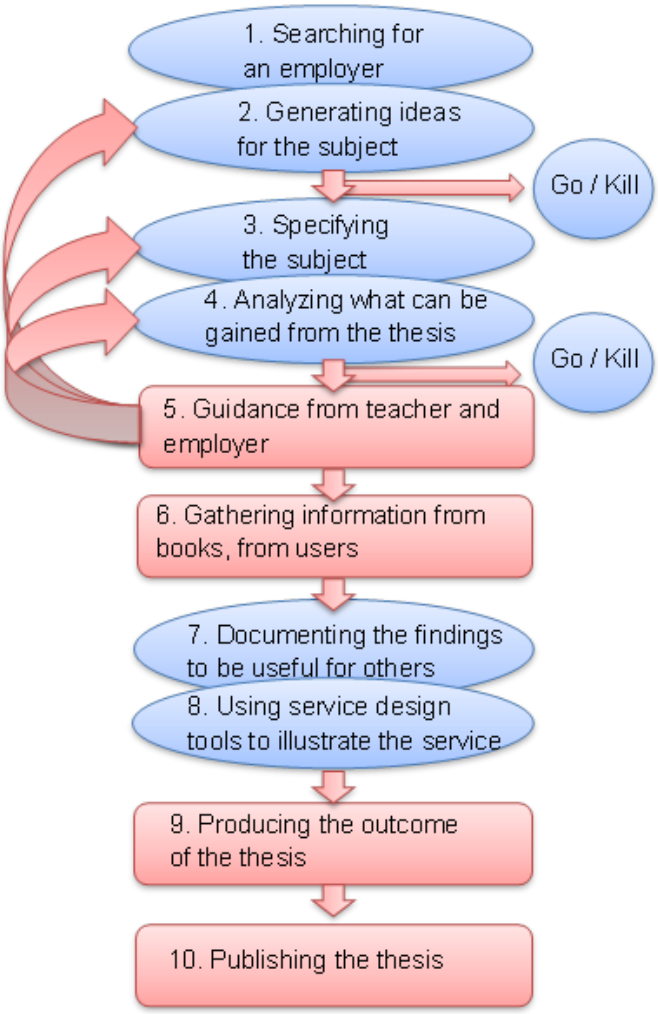


Figure 17. Thesis process

4.2 Observation

Often the suppliers of industrial services are without a clue when it comes to the factors that form customer value. Huttu (2014, 16-17) believes that observation is the right method for understanding customer value and how it is generated. With observation it is possible to understand in depth the significance of the service in customer's process and identify the factors that create customer value.

The main thought in observation is to study people, their behavior and phenomena in their natural habitat. For example homes, offices, shops and cars are great places to observe people while they are feeling relaxed.

(Huttu 2014, 16-17; Goodman et al. 2012, 213.) According to Huttu (2014, 18) there are three recognizable reasons why observation should be used:

1. Customers often find it hard to tell everything affecting the customer value.
2. Customers cannot usually assess their future needs correctly.
3. With observation it is possible to get a better idea of the operation situation of products and services and the situation's effect on the customer value.

Goodman et al. (2012, 216) agree with Huttu that by just interviewing customers there may be some things that can be easily left out and that observation is needed to fully understand the operation situation of the service or product. They would also add that

4. observation is important for challenging and correcting assumptions, since it is service provider's/manufacturer's job to make the service/products more suitable for the user.

Different kinds of observation methods can be divided into groups by their structuredness, the observator's participitance in the observation and whether or not the observator's role is exposed. Structured observation is a quantitative method and its focus is on pre-determined functions. In the unstructured observation, quality and increasing knowledge on a determined subject are important. From an unstructured observation it is possible to distinguish four different observation types (figure 18): observation without participation, participative observation, comprehensive participation and observation in concealment. (Huttu 2014, 17-18.)

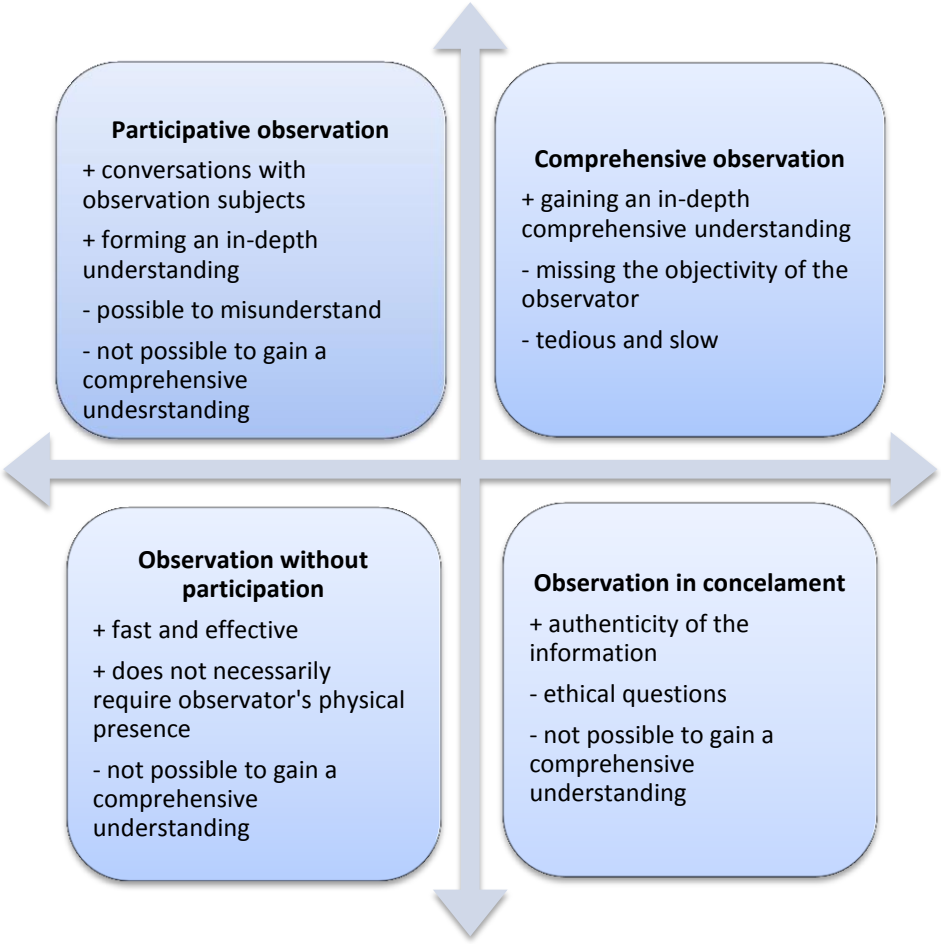


Figure 18. Different types of unstructured observation (Huttu 2014, 18)

The observation process starts with a selection of a focus group and observation subjects. The selection is influenced by the purpose of the observation, diversity and significance of the subjects and resources. When considering who the observator might be and whether or not he/she is exposed it is important to think about the purpose of the study, resources and ethical questions. Previous studies have shown that an outside observator is more objective and more trusted by the employees, but he/she is also more unaware of the customer and the observation situation. (Huttu 2014, 20-25.)

Before the actual observation it is important to get familiarized with the subjects of the observation. Familiarizing oneself with the subjects and literature before the observation can able the observator to focus better on the essential matters, but it can also cause the observator to lead the

observation in a specific manner, which should be avoided. Making observations is an ongoing process, which is why making notes during the observation is extremely important. Detailed notes able the observator to remember specifics long after the observation has taken place. (Huttu 2014, 20-25.)

4.3 Designing the observation

Observation was decided to use as one information source for the thesis. As the author did not have much knowledge on the production of wood products, it was realized that therefore it would not be possible to understand the users or their job. The reasons for executing this observation based on Huttu's (2014, 18) and Goodman, Kuniavsky and Moed’s (2012, 216) reasonings:

1. It was not believed that enough information could be collected through interviews. Besides the language barrier, there was not enough time for the users to depict everything that was necessary.
2. Especially when talking about technology, it would have been difficult for users (who supposedly have not studied online before) to imagine what kind of new possibilities eLearning would bring to the training.
3. To gain a comprehensive perspective, the wood product manufacturing process needed to be seen as well as what the users do there and how their training is currently performed.
4. There were many assumptions of the users and their current training methods (and facilities). But since there was no prior knowledge on the author’s part from this kind of process or users, the assumptions could not be trusted.

The purpose of the observation was to understand the users of the service, their training and their working environment better. The observation took place at Corporation X's customer's factory in September. There it was possible to observe their working environment, their training and the users' behavior during working and training.

It was clear from the start that the observator would be the author of this thesis, which was good for getting a more objective perspective since the author had little knowledge on the actual factory and its workers, but had some knowledge on the wood product manufacturing process and the customer. The observations were focused on the European customer and their staff. It was decided that the working facilities of the users (the factory), the users in their working facilities and the training situation (and users in that situation) would be observed. (Huttu 2014, 20-25.)

Before going on site to do the observation, the author familiarized herself with the topic and made a list of things that needed to be observed and predicted a few possible answers to those hypotheses. (Huttu 2014, 20-25). Three observation tables (appendix 6) were made of the issues that needed to be observed, and the tables were filled whenever there was a chance. Below the main questions from the observation are listed and divided into three sections: facilities, users and training.

When observing their working facilities, these questions needed to be answered:

- How big of a process is it?
- How many lines have a worker?
- Are there lots of workers?
- How many workers are there per line?
- Is there a possibility to study?
- Is there a possibility to have/use technological devices?
- What kind of atmosphere is there?

When observing the users at their job, these questions needed to be answered:

- How old are they?
- Are they mostly male?
- What are they doing?
- Are they busy?

- Are they socializing with each other?
- Do they seem motivated?
- Do they use any kind of technology apart from machinery?
- Does anyone have any technology with them?

When observing their training, these questions needed to be answered:

- What kind of studying facilities they have?
- How is the training executed?
- How do the users respond to the training?
- Is there interactivity with the users?
- Are the users motivated?
- Are the users active?
- Do the users use any kind of technology during training?

These questions were chosen to either confirm or to reject assumptions that had been formed before the observation, such as "users are not motivated about training" and "the users are mostly male".

The observation was an unstructured observation, since quality and increasing knowledge were the main objectives (Huttu, 17-18). From the four types of observation, this observation would be categorized as "observation without participation". The idea was to be as invisible as possible for the subjects, so that they would not act any differently and the observator would be able to observe the most authentic situation as possible. Three different observations were performed: observing their working facilities on the first day (a tour around the factory), observing users and their training in a training situation and observing the users in their working facilities again during the second day. Notes were made on a computer as soon as possible and the notes were transcripted on the day after the observations to minimize any lapses of memory (Huttu 2014, 20-25).

On the first day of the observation the factory was toured for a couple of hours and understanding of the wood product manufacturing process

gathered. Many of the machines were on halt that day, so it was not possible to see the factory in its full power. Some observations of the users were made that day, but the main focus was on the process and its magnitude.

After the tour in the factory, the training situation was observed. The training lasted for 8 hours that day, but because of other engagements, the training situation was observed only for two hours. The training took place in a small barrack, so it was not possible to observe the situation and the users from afar or behind them, what was the initial intention. The observation was carried out from a corner where it was possible to see the entire training situation. The users were able to see the observer, which could have affected their behavior. The trainer introduced the observer shortly, but did not explain who she was or why she was there in detail.

On the second day the factory was toured again for about 1-2 hours, with the intention of observing the users. This time there were more workers since there was more machinery running. When the factory was toured, safety gear was worn, which entailed a white helmet and a safety west. This could have caused some attention from the users, because the white helmet and the safety west differed from the way the factory workers were dressed. But, there were many workers there from Corporation X dressed that way on a daily basis, so it is likely that the users had gotten used to it and therefore it did not cause damage for the credibility for the observation.

4.4 Evaluation and selection of learning management systems

The process that a corporation uses in evaluation and selection of an LMS can have a relevant impact on the recognized success of the implementation of LMS and the definite satisfaction of the corporation (The eLearning Guild, according to Foreman 2013). That is why the process of choosing an LMS is consequential. When you Google "LMS", on the first page of the search results there are lots of service providers selling their LMSs and many sites dedicated to comparing and assessing the best

LMS. It is easy to get confused with all of these options, because they all say the same and look similar on the outside. That is why a closer examination of LMSs should be executed with the right methods. Since the concept of LMS has been explained previously in subchapter 3.2, this subchapter focuses on how to choose the correct LMS.

There are many different ways to assess LMSs. In subchapter 3.2 are presented Lasarkis's (2014), Rojas's (2016) and Fenton's (2016) views on what makes a good LMS. These features are important in assessing an LMS, but they are quite general and not enough for a deeper evaluation. Valtiokonttori (2016a; 2016b) has presented their own evaluation tool that uses evaluation criteria as a checklist for assessment of public network services. Parts of it can be applied to evaluation of learning management systems as well, but the tool is not directly applicable. Their assessment criteria consist of five main categories: use, content, management, producing and benefits. These categories include 40 criteria, and each criterion consists of two to seven attributes. (Valtiokonttori 2016b.) Valtiokonttori (2016b) has also defined a scoring system for the evaluation (figure 19).

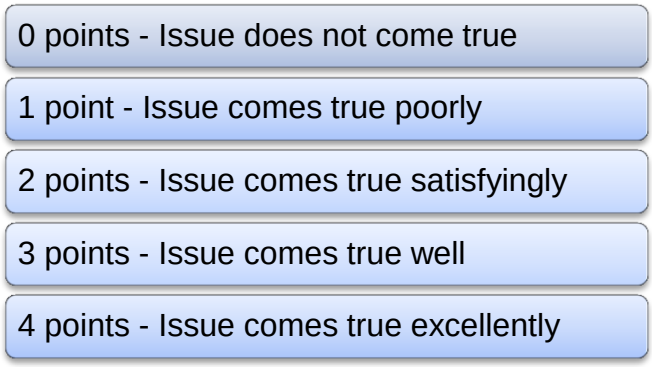


Figure 19. Scoring system for evaluation of network services (Valtiokonttori 2016b)

For an in-depth evaluation and selection process Foreman (2013) presents a five-step plan for finding the right LMS depicted in figure 20.

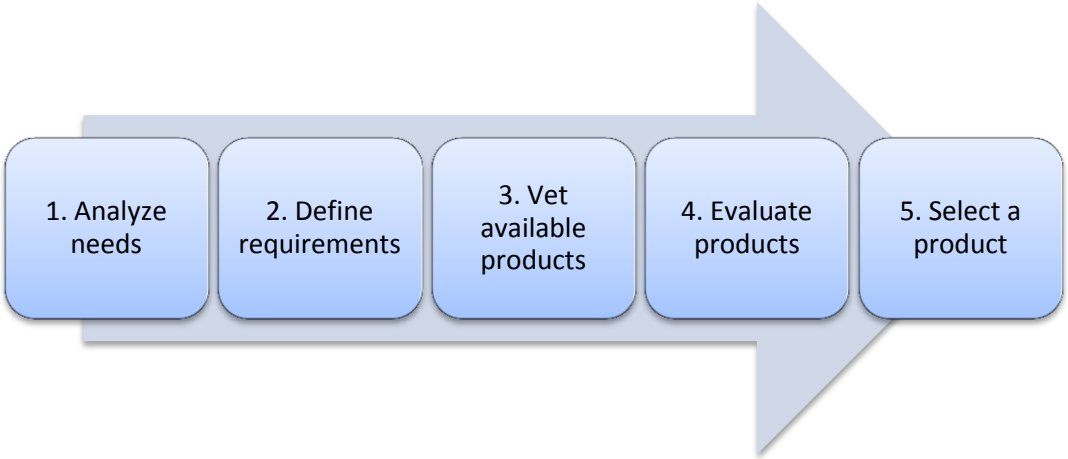


Figure 20. LMS selection and evaluation process (Foreman 2013)

Foreman's (2013) plan starts from the needs analysis. This is the part where information should be gathered from the management team, stakeholders, users of the current LMS (if there is one in use), employees and the IT department. Based on this information, strategic, operational and technical drivers should be identified. Based on the drivers and needs recognized in the first step, the necessary requirements for the LMS should be defined. The requirements should focus on what the users (learners and administrators) should be able to do with the learning management system. There are three categories that can help in organizing the requirements: functional, technical and cost. Once the requirements are in place, vetting of the different LMSs from the hundreds of options can begin. To narrow down the choices, 8-10 distinctive requirements should be identified for ruling out the non-suitable options. When the choices are narrowed it is possible to start a deeper evaluation of LMSs. Every step of the product evaluation process (figure 21) narrows down the choices.

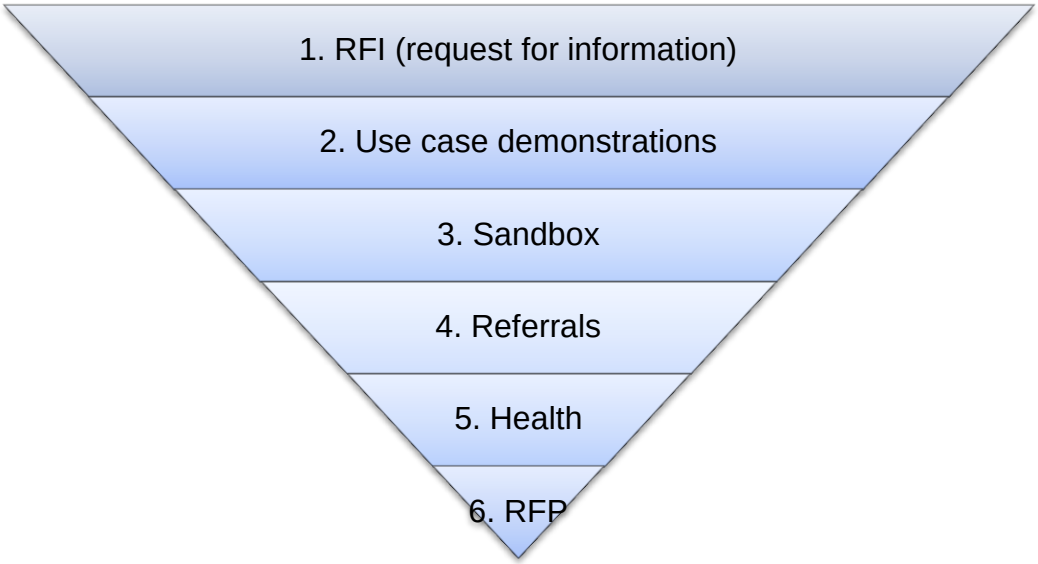


Figure 21. The product evaluation process (Foreman 2013)

In the first stage (RFI) of the product evaluation process LMSs *vendors are approached* with a sheet of questions concerning the previously defined requirements. Vendors should also be asked to demonstrate their products for example through *use cases* presented by the customer. After this the product should be evaluated through a *demo version*, where it is possible to explore the product's design, features and capabilities. To get an idea how the LMS works for an actual client, *existing customers should be contacted* and asked questions about their use of the product. To be absolutely trusting towards the company that is providing the LMS, their *financial reports* should be looked at. Good financial stability and referrals can indicate that they will support, evolve and improve the product. After all of this preliminary work making the *request for proposal (RFP)*, selecting the product and negotiating best pricing and terms should be easier. (Foreman 2013.) Pappas (2015) is in agreement with Foreman's first few steps: recognizing and listing needs of the corporation. He continues by saying that along with current needs, the future needs should also be considered. From the user's perspective, the technical limitations of the users should be considered like what kind of equipment they will be using.

4.5 Designing the evaluation and selection of learning management systems

In this thesis, the process of evaluating and selecting the correct LMS for Corporation X's eLearning service (figure 22) was mostly consistent with Foreman's (2013) five-step plan presented in the previous subchapter. Some of the steps in his plan were not necessary or practical in this case and therefore were left out. This subchapter explains this thesis' selection process of the LMS by mirroring the steps to Foreman's (2013) plan.

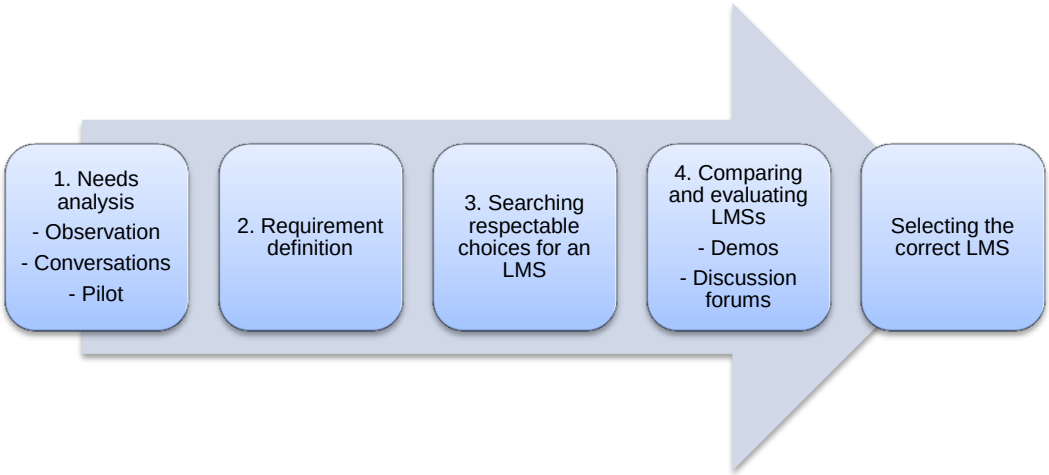


Figure 22. Thesis's LMS evaluation and selection process

The evaluation and selection process of LMSs started by analyzing needs in accordance with Foreman's (2013) plan. The needs analysis started when the observation performed in the facilities of Corporation X's client. The observation gave information about the user's current training, the wood product manufacturing process and the user base. Besides the observation, every-day conversations at the workplace had an effect on the needs analysis. After the analysis the needs were divided into three categories: strategic drivers, operational drivers and technical drivers (Foreman 2013).

The second phase, requirements definition (Foreman 2013), was done in less detail than the 30-60 requirements proposed by Foreman (2013). The definition of requirements was based on the tool provided by Valtiokonttori (2016b), workplace discussions, the observation, eLearning pilot and

needs analysis. Valtiokonttori's tool helped to decide some of the requirements, but their criteria was not directly applicable to an LMS evaluation since the service will not be public (Valtiokonttori 2016a). In the piloting process Moodle was already in use, which provided information about what kinds of features should be regarded. Not all of the requirements were specified at the same time, but rather collected throughout the evaluation process. The final requirements were organized according to Foreman's (2013) three categories: functional, technical and cost requirements. The requirements were gathered in a spreadsheet for LMS comparison.

Third phase of Foreman's (2013) plan was put into action: product vetting. This was mostly done by searching through the Internet with the help of Google simply searching "learning management system". As the author had previously used a few different LMSs, they were also taken into consideration. With Google search Capterra (2016) was found, whose evaluations and lists of LMSs were used in narrowing down the options. The LMSs found in this stage were put into a spreadsheet, which compares different LMSs by their cost requirements and general, superficial evaluation of pros and cons (appendix 7).

In this thesis, the fourth step of the selection and evaluation process of the LMS (figure 22) differed a bit from Foreman's (2013) plan. His product evaluation process included requesting information from the vendors, which was felt unnecessary and time constraining in this case. Since the vendors were not contacted, use case demonstrations were not asked. By then the choices were narrowed down to five options. Since there was not any use case demonstrations, the LMSs were examined carefully through free demo versions via computer with the help of a spreadsheet. This spreadsheet consists of the requirements and the names of the five most promising LMSs (appendix 8). All of the requirements were carefully tested and other features of the LMSs that were not considered before were viewed and their need assessed. The LMSs were viewed through the eyes of a user and admin. Customer references were assessed via discussion forums and the LMSs providers' own websites. Financial health of the LMS

providers was not checked, as the financial matters were not in focus of this thesis.

The last stage was scoring the five LMSs on a scale of 0-4 according to Valtiokonttori's (2016b) evaluation scoring system. The purpose of the scoring was that one LMS resulted to be the best, but of course some functions can have more value than others. Still, these scores give a valid indication on what could be the most suited LMS towards the needs and requirements listed at the start of the process. In this case, the selected LMS was the same as suggested by the scoring system.

4.6 Pilot based development

According to Alam and Perry's (2002, 525) model (appendix 1) piloting is a part of the new service development process. This is agreed by Mikkola and Simons (2014, 136) who continue that piloting's basic idea is that the developed solution is tested in practice. The objective of piloting is to make sure that the developed solution is functional and develop it further based on the information gathered from testing it in practice.

In industrial services, piloting is necessary in service development because it gives an insight into the customer's business. Evaluation of the solution's functionality and applicability for the customer, learning customer's operational environment and ways of action, recognition of the central elements of the solution and understanding customer's views on competing solutions are all benefits gained from piloting. Along with learning about the customer, piloting offers an opportunity to influence the customer and teach how to use the service before it is implemented. (Mikkola & Simons 2014, 137.) An example of a piloting process is depicted in figure 23.

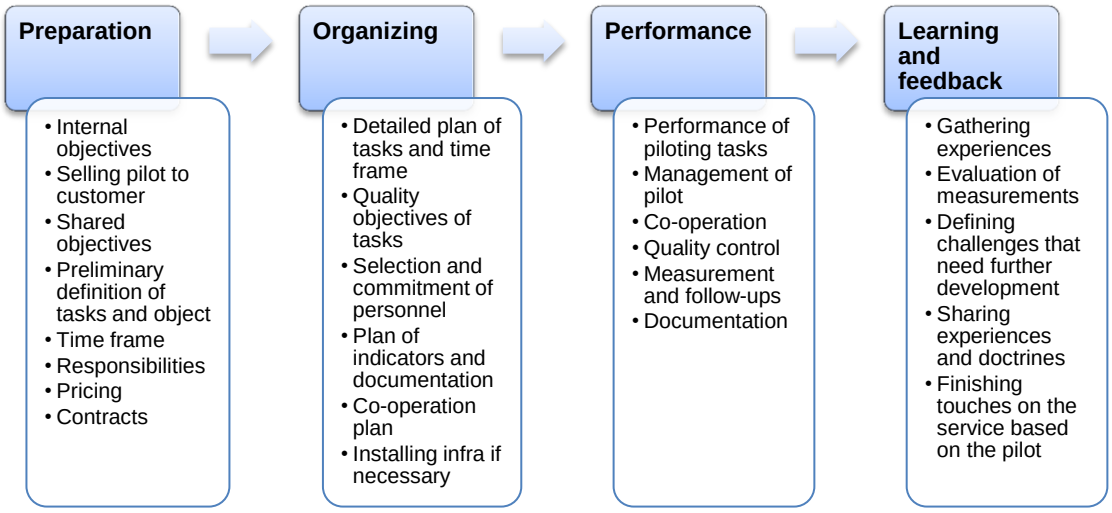


Figure 23. An example of a piloting process (Mikkola & Simons 2014, 138)

Key to a successful piloting process is common understanding and co-operation with the customer. Customer should be involved in every phase of the piloting process (figure 23) in different levels and different functions. Service provider should discover differences and commonalities between their and customer's strategies, processes, practices, resources and organization. By understanding these differences and commonalities, it is easier to reach common goals.

4.7 eLearning pilot

The eLearning pilot started in 2016 and it will continue until February 2017. The pilot is done in cooperation with a European client (a wood product manufacturer), that has just recently started their factory. The LMS used in this pilot is Moodle, provided by a Finnish technology services company. During the pilot the LMS was set up, studying materials and examinations made and translated for the users and observation completed. eLearning will work as an option for customer; customer can either only use the eLearning service or compliment the current training service with it.

Currently Corporation X has a training service, which is focused on teaching customers' employees about the wood product manufacturing process and related machinery. Based on the observation and workplace discussions, the training sessions are usually held in customers' facilities, in a classroom format, where the trainer speaks and users listen, read and watch the materials and perform exams. As Corporation X provides their products and services globally, the training services are necessary around the world. This forces the trainers to travel a lot and Corporation X to have the resources for the trainers. Even though the training sessions enable a face to face interaction and possibly a live demonstration of the machinery, it is costly and sometimes it is difficult to arrange.

The purpose of the eLearning pilot is to find out what the service would look like, recognize the problems and development possibilities and to assess its functionality (Mikkola & Simons 2014, 136). This thesis has proceeded side by side in close contact with the pilot and they have supported each other through the process. Because of the pilot this thesis has gained more insight on Corporation X as a corporation, its way of actions and development of industrial services in practice.

The thesis affects the pilot through collecting and analyzing information that is applicable to the pilot. For instance, the observation gives the pilot knowledge on the user base, which can and has been used in designing the LMS. The LMS analysis gives a detailed report on available LMSs, compares them to each other and scores them to make an informed suggestion on what the ultimate LMS should be. During the pilot the analysis can and has influenced on the factors by which the decision of eventual LMS is based on. The suggestion of the best LMS presented in this thesis can and has been used as a comparison for the current LMS, Moodle. It is necessary to point out that this thesis’s purpose is to benefit the commercial version of the eLearning service rather that the pilot. This thesis does contribute to the piloting process as well, but piloting and this thesis are both tools made to use together for making the new service, not to benefit each other.

5 FINDINGS

This chapter has gathered all lessons learned from the knowledge base and methods. First are presented the detailed findings of the observation and the LMS evaluation and selection. Then the final output of the thesis is introduced and a reflection on theory is presented in the last subchapter.

5.1 Findings of the observation

The findings of the observation will be presented through the questions presented previously in the subchapter "Designing the observation". Findings of the questions are divided into three sections: facilities, users and training. In this subchapter "worker" and "user" are used as synonyms and both refer to the user of the eLearning service.

The facilities in customer's factory are substantial. There are many different lines, which are mostly automated. Some of the lines were not working at the time of the observation, since the factory is quite new and there are still some issues with them. Safety is clearly a concern in wood product factories, since there are gates, locks, light curtains etc. to make the facilities as safe as possible. If the staff will not create any hazardous situations themselves, for example by using forklift uncarefully, there are not that much safety concerns for the staff. The exact amount of the workers is difficult to assess, because the facilities are so big and the workers work in four shifts. There is usually one operator per line, except for a few lines that have multiple workers. There are not many independent studying possibilities in the factory, as there is only the breakroom where you are away from the machinery. There are not a lot of possibilities to use any technological devices apart from what is connected to the machinery. The atmosphere in the factory is tired but still hard-working.

Based on the observation, the users are mostly under 40-years old, but there are lots of over 40-year-olds as well. It is hard to say which age group is largest since the users were observed for only a couple of days

and therefore it was not possible to see every user. As the presumption was that there are more men than women working there, it is surprising to discover that there are a lot of women working at the production lines. Based on this observation it is impossible to say whether there will be more male or female users for eLearning. The users work at their workstations as fast as the machines require them to and do not have much time on their hands to focus on something else. Even though their tasks are simple, it requires a great deal of attention at all times. There is not much socializing between the users and they are a bit serious and tired, quite nonchalant. They do their work but do not look like they are motivated. No one uses a phone, computer or any other device which could be their own, probably because they do not have a chance to do so. For the users, safety is not as important as it is for Corporation X's employees.

The training facilities are not a priority since not much is invested in them. There is not much room to move around, and the décor is quite plain. For the users there are desks and chairs, and for the trainer there is a desk, a chair and the equipment for a presentation. The facilities are not inviting, motivating or pleasant. The training methods are not diverse as there are not a lot of possibilities to be diverse. The trainer uses Power Point presentations, videos, teaching materials (on paper) and practice at line as teaching methods. Users who have been working longer have more interest in the training than those who are newer to the job. The users listen and watch the trainer, but also skim through the teaching materials. Phone and other electronical devices are rarely used by the users, perhaps because they do not have them with them or because of norms learned from their previous experiences regarding classroom education. Videos get the users' attention if they are used systematically throughout the whole training (not all at the same time). Interactive training excites the users the most. When they have a possibility to get up from their chair they become more interested and responsive to the training.

5.2 Findings from the evaluation and selection of the learning management system

The results from the analysis of needs regarding the LMS are divided into three categories (table 1): strategic, operational and technical drivers. The strategic needs include growth in technology services, training and eLearning. Operational drivers are the costliness of training customization for every customer's needs and commuting trainers around the world. It is also harder to collect data about customers and their employees via the current training system and the current training's effectiveness is hard to assess. Accessibility, usability and compliance with different kinds of devices (such as computers, tablets and mobile as well as the main interfaces: Windows, Android and iOS) are the technical drivers.

Table 1. Recognized needs the eLearning service

Strategic drivers	**Operational drivers**	**Technical drivers**
Growth in technology services	Costliness of the customization of training according to customer	Accessibility
Growth in training	Commutes of trainers	Compliance with different kinds of devices and interfaces
Growth in eLearning		Usability

Based on the need analysis, the requirements were formed and categorized into three groups (table 2): functional, technical and cost requirements. Functional requirements include platform appearance, usability, surveys, exams, course management, links, user management, analytics and service provider. Technical qualities are platform lay-out, navigation, language options, accessibility, the ability to handle increasing

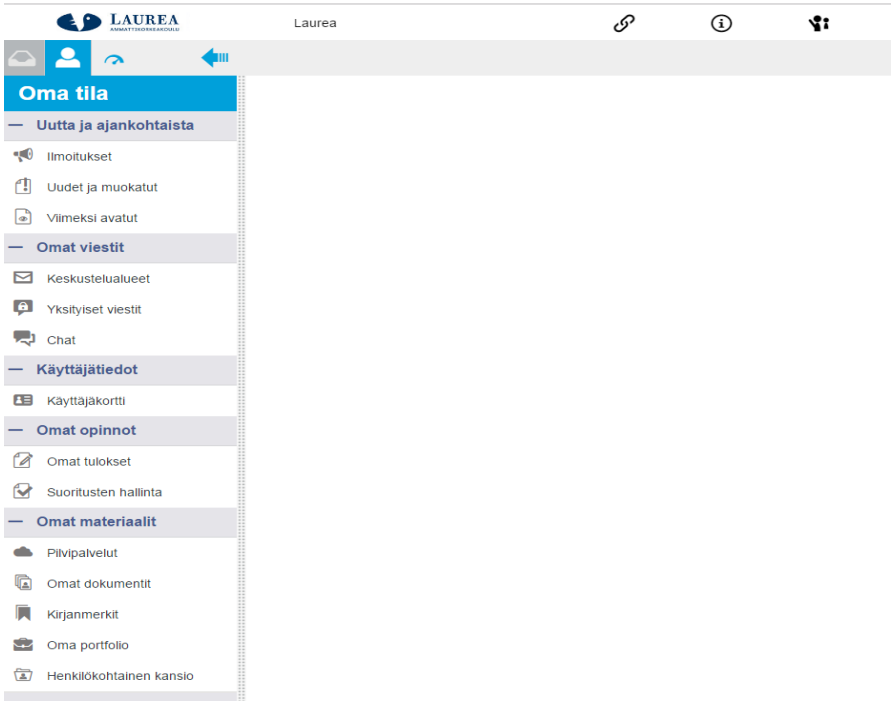
number of users and the ability to be easily modified. The third category, cost requirements, has only one requirement: price. During the evaluation and selection process the prices of the LMSs were compared to each other, but as the financial side is not in focus of this thesis, the prices were not compared to a budget and are a secondary issue. Still it is taken into consideration that the price of the LMS is not unreasonably steep.

Table 2. The requirements for the eLearning service

Functional	**Technical**	**Cost**
Platform appearance	Platform lay-out	Price
Usability	Navigation	
Surveys	Language options	
Exams	Accessibility	
Course management	Ability to handle increasing number of users	
Links	Ability to be easily modified	
User management		
Analytics		
Service provider		

The vetting of the LMSs is guided by these requirements. From all of the LMSs listed on Capterra (2016) ten are presented through a report presented in appendix 8: Optima, Totara, Metaverstas's option for game-based learning, Moodle by Valopi, Docebo, Easy-lms, NEO, Matrix, Moodle by Mediamaisteri and iSpringLearn.

Optima (picture 6) does not meet the criteria especially regarding the appearance and functionality requirements. From Totara, there is not a demo version easily available so many functions of the LMS are hard to assess. According to Totara's (2013) video Totara LMS is better suited for a different kind of corporate training. Metaverstas's option for game-based learning is different and intriguing, but the technical execution in their previous work is not good enough and making games is costly. Currently it seems that there is not enough benefit to gain from a game-based training, but in the future it should be considered again. Corporation X's eLearning pilot has enabled testing Moodle by using a demo version provided by Mediamaisteri. Valopi is another choice for a Moodle provider, but their website is not modern and professional enough as platform providing experts should have, which is why Mediamaisteri is a better option for the service provider. NEO and Matrix are two different LMSs provided by the same company for different purposes. NEO is more suited for educational institutions and therefore has a lot of unnecessary features for this purpose. As Optima, Totara, Metaverstas, Valopi and NEO do not seem suitable for the eLearning service, they are no longer considered.



Picture 6. An example of an LMS view from the user's perspective (Optima 2016)

The demo versions of Docebo, Moodle by Mediaverstas, Matrix, Easy-LMS and iSpring Learn were tested thoroughly. The functional and technical requirements guided the testing of the demo versions (appendix 8). According to these requirements the LMSs are scored on a scale of 0-4 (figure 25) by using Valtiokonttori's (2016b) evaluation scale.

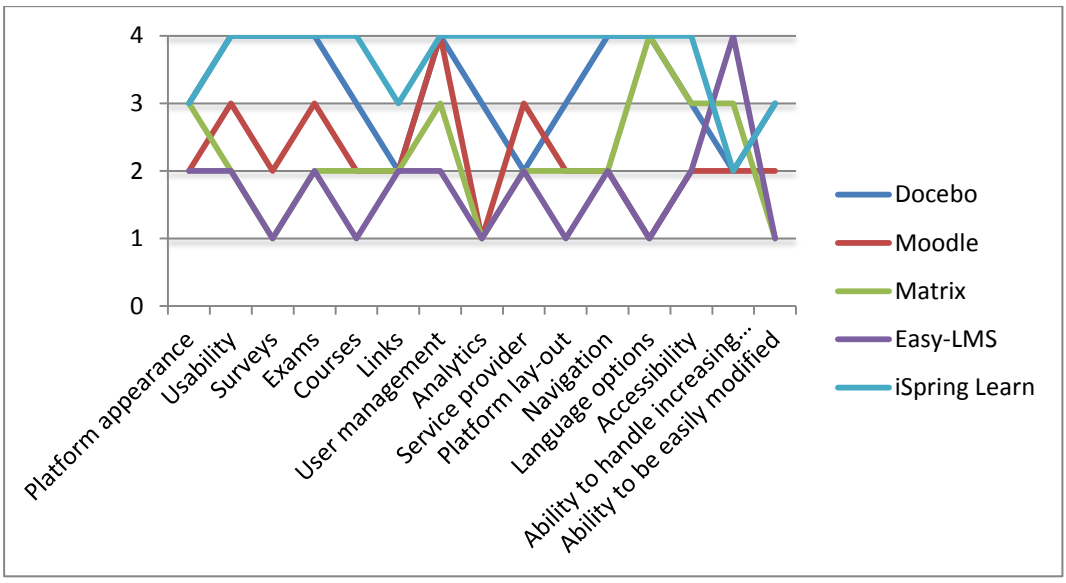


Figure 25. Evaluation of LMSs

From this evaluation and selection process, iSpring Learn is selected, because its average value (3,6) is higher than the others' and it scores well on the key requirements such as usability and analytics (appendix 9). It looks to be the most suited for Corporation X's needs as it enables doing HTML 5 content easily as well as great exams and surveys and it can be whitelabeled according to Corporation X's image. iSpring Learn is also compliant with the operational drivers, it is mass-customizable and with it is possible to educate and study without a trainer present.

5.3 Outcome of the thesis

This thesis's knowledge base provides insight into industrial services and digital learning. The most important thing to understand from development of industrial services is the creation of value to the customer. The customer's, service provider's and value network's capabilities need to be

recognized and customer's value creation process must be understood for a full comprehension on how to bring value to the customer. Mass customization and modularity enable providing value effectively and profitably. Locating the key aspects of the service and transforming them into independent modules, transforming the supply system into flexible units, defining what can and cannot be customized and deciding how the customization will be performed are elements of an effective mass customization. The development of a new service happens through a series of steps that can vary depending on the size of the corporation. There are many NSD models presented in literature, all of which emphasize the customer's role in the development process. New services (and old ones) should be illustrated through customer journey maps, user profiles and service blueprints for getting a good comprehension of the service.

As the industrial internet provides a steep learning curve, the employees in manufacturing industries need continuous training to keep up with the development. In addition to traditional face to face training, eLearning is a great option because of its accessibility. It can be accessed at any time, from anywhere, by anyone and with any device. To provide an eLearning service, a learning management system is required. There are many different LMSs for different purposes with many features, which is why it is important to define the requirements that are necessary in the kind of LMS that the organization is looking for. Usability is one of the main aspects that need to be considered in an online service. In usability continuity is important: if someone does not understand how something is used, it is likely that they will not use it again. Especially in online services human-computer interaction must be thought of for assuring that the user is able to make sense of the service. To making sure that something is usable, user research and usability testing must be applied. By implementing them an understanding of the service's usability can be formed by using focus groups which can be generalized into larger audiences.

The observation shows that industrial workers do not have enough time in the workday to use eLearning and for everyone it is not possible to use it

while working. The employer either needs to find time from the work day for studying or offer incentives for the users to use the service at home. The users that have worked longer in the job are more motivated to learn more from the job, than those who are new to the job. Typical lectures and reading materials do not arouse users' interest like interactive learning that seems to really activate the users. The users' technological skills are hard to assess based on the observation, as the users did not have any of their own technological devices on hand. Because they do not use technology (apart from what is connected to the machinery) at work, it is likely that their technological skills are not that good that they would be able to use a complex LMS. That is why a simple LMS would be usable, and was considered in the evaluation and selection of LMS. In accordance with the needs analysis, the strategic drivers for the LMS of the eLearning service are growth in technology services, growth in training and growth in eLearning. The operational drivers are costliness of the customization of training according to customer and the commutes of trainers. As technical drivers accessibility, compliance with different kinds of devices and interfaces and usability are identified. The requirements for the eLearning service are categorized into three sections: functional, technical and cost requirements. Functional requirements are platform appearance, usability, surveys, exams, course management, links, user management, analytics and service provider. Platform lay-out, navigation, language options, accessibility, ability to handle increasing number of users and ability to be easily modified are the technical requirements. The only cost requirement is price. By using these drivers and requirements iSpring Learn is selected with the average of 3.6 by using a scale from 0-4.

The main outcome of this thesis is a (proposal for) mass customized eLearning (industrial) service. The developed service's base is the learning management system iSpring Learn. It is illustrated with the help of three user profiles that are based on the observation: Helen, Tomás and Arvi (appendices 10-12). For these users three customer journey maps were made (appendices 13-15). These user profiles and customer journey maps worked as indicators on what the users are like and how they use

the service. The developed service is depicted via these users and the administrator perspective. The layout of the service is illustrated in the service blueprint in appendix 16.

The parts of the service were recognized and divided into basic and customizable elements (figure 26), based on what can effectively be customized. The basic elements will be the elements that are the invariable basic building blocks of the service, and the customizable elements are the elements that the customer can affect. The elements that were chosen as the base for every customer's eLearning experience are chosen because their customizing is time consuming and therefore their customization would reduce the efficiency of the service. Also, they do not need to be customized as they are also the elements that differentiate the service from other similar solutions. The customizable elements are the elements that need to be customized according to customer's individual needs as companies have different practices and different requirements. They are also relatively easy to customize for every different customer, for instance groupings, language and users are not hard but necessary to tailor according to a specific customer.

Basic elements	Customizable elements
• LMS • Basic display images • Pricing • Survey • Layout & Visual appearance • Instructions • Main settings • Base of study materials • Base of exams • Analytics	• Language • Display images of courses • Users • Groupings • Courses • Course and permission settings • Details of study materials • Details of exams • Reports of analytics

Figure 26. Basic and customizable elements of eLearning service

The user portal is very simple in iSpring Learn; the user can see the courses that are assigned to him/her as mandatory or optional and can see what courses are already performed. In Helen's case where it is not mandatory for her to study any of the courses, all of the courses are shown as optional. Especially in Corporation X’s case where the users are not very skilled in technology, the clarity of the user portal is important; the users can immediately access the courses from the front page. The courses can be sorted by for instance the title, and a little description of every course can be viewed to see what the course entails. The courses are displayed by a picture, where it is possible to add for example line pictures as a visual presentation.

iSpring Learn's course view shows all of the contents of the course such as studying materials, exams and surveys. It is very simple and clear and there are not any unnecessary features that can distract the user. Its modern look gives an appearance that Corporation X is modern as well. The contents open up in a small pop-up window in a power point form. This power point form is common for all of the contents, so the user does not need to learn how to use multiple different formats. For Corporation X’s customers’ employees it is easier that they have to learn to use only one format. Take Arvi for instance; he does not like or know how to use technology, so when facing too many problems with the LMS it is likely that he will get frustrated and give up. Therefore it is easier that he learns how to use the content only one time without having to struggle with many different forms of content. If the comments function is enabled by the administrator, discussions can be had in every course. This allows a better interaction between a group of users and between the users and teacher. For example giving feedback, asking for help and making announcements is easy this way. This is an important interaction in eLearning as there is no face to face contact.

In iSpring Learn the administrator's dashboard is a tool on the front page to see short reports of activity. The point of this is to be able to view new

activities effectively when logging in. This is an effective tool for a quick analysis every day when the service is being used by multiple corporations. It easy to see e.g. what materials are being viewed the most and in Corporation X’s case where there will be multiple organizations and thousands of users it is a good tool for easily keeping track of the changes.

Managing courses happens in the content section in iSpring Learn. The general view shows all the courses that currently exist. Creating new courses and adding new material also happens in the general view of the courses, and some details of courses such as new comments are shown there. On every course, there are seven tabs where the course can be managed: details, outline, settings, availability, permissions, invite and comments. The most important functions of these are outline, permissions and comments. The course's chapters and contents can be managed in "outline". For example adding materials to courses happens here. Corporation X has many materials for the users to study, so it is important that adding them is effortless. In "permissions" the users' viewing rights to the course can be managed according to the organization, group or a specific user. The course can be determined to be required or optional, which will show in the user portal either as "To Do" or "Optional". This reduces user's confusion on what is required to be done. Strict implementation of permission rights can be important to some of Corporation X’s customers who want their employees to see only what is necessary for them to know. From the administrator’s perspective the comment section is an important way to reach users for example receiving feedback or for sharing information. The course in its entity from the user's perspective can be viewed through the preview function.

User management in iSpring Learn happens in the section titled "users", where users, groups and organizations can be added individually or as an entity. This is an important feature for Corporation X because if there are dozens of customers with hundreds of employees, their management needs to be easy. For example if there are three companies, Wood product Inc., Wood services Inc. and Wood manufacturing Inc., whose

hundreds of employees do not need to perform all of the same courses, they can be managed separately. Therefore three organizations are added into the LMS, and each of these organizations are divided into groups, for example maintenance and operators, and the courses and settings can be assigned to both groups individually. This is mass customization; the courses are not assigned to each person individually but they are still customized as the courses are not the same to everyone.

The general settings are important especially because of the branding configurations. From the branding page in iSpring Learn the overall appearance is set; the color, logo and favicon can be set to match corporation's visual appearance. The name and URL of the LMS can be changed via account info. All of these are important for branding the service correctly. Corporation X has a clear visual appearance and instructions to follow this appearance in all actions concerning the company.

The kind of data the LMS collects is very important for further development of the service. The analytics page provides different options for different needs. It is easy to use as the kind of data that is wanted can be filtered and exported to the computer for example into Excel. This makes the analyzing process easier and faster. For example, for Corporation X is important to know what questions the students pass and do not pass. This can be seen straight from the report and an analysis of the reasons can be conducted. Or if a customer wants to know whether or not Tomás has passed the required courses what has been the requirement for continuing at his job, Corporation X can give that information to the customer.

5.4 Reflection on theory

Hyötyläinen (2007, 15) listed training services as traditional industrial services. He also talked about the importance of IT in the development of industrial services. The eLearning service combines both of these as it trains employees online, which also enables collecting better data. Because of user's the steep learning curve caused by industrial internet

(Katchi 2016), continuous training of employees is needed. As the purpose of service business is to produce value to the customer based on their needs (Malinen 2007, 88), it can be argued that training services produce value to the customer, and eLearning enables doing it continuously and effectively.

According to Kotha (1994, 589-590) it is necessary to decide whether or not mass customization is necessary. In the eLearning service mass customization is necessary as it enables the service to be more effective but at the same time the variation level of the service is higher (Ahonen et al. 2007, 17). Also, one of the operational drivers for the LMS was to make customization of the training according to customer more effective. For the mass customization to be effective the limitations in where to do customization must be set (The Economist 2009) and for doing that the production process must be changed into rearrangable units (Feitzinger & Lee 1997; The Economist 2009). The basic and customizable elements of the developed eLearning service are presented in the figure 27.

The eLearning service follows the three stages of the new service development process presented by Gebauer et al. (2006, according to Gremyr et al. 2014): identification of market needs (need for employee training), development of new services (development of eLearning) and market introduction. The development of the entire service is not done as this thesis does not provide all of the necessary elements, like the content, and therefore market introduction is not yet done. To understand the new service from the user's perspective (which is essential in industrial services) customer journey mapping is used. The customer journey maps help to understand the steps that the user goes through regarding the eLearning service. (Curedale 2016, 38-39.) The customer journey maps are based on the user profiles (Lord 2013) of Helen, Tomás and Arvi for creating more realistic situations. They are based on the observation as the user profiles should be based on real data and represent groups of users. (Curedale 2016, 51.) The service is also illustrated in a service blueprint, because by blueprinting the new eLearning service is easier to conceptualize and visualize (Seyring et al. 2009, 4).

As Staffans (2011) says, the classroom can be just about anywhere, including online. The eLearning service can be accessed by anyone with permission, at any time as it is network based, from anywhere with internet connection and with any device as iSpring Learn supports computers, tablets and mobile phones (Zhao 2011). The eLearning service is a great fit for Corporation X as Corporation X has customers all over the world and the users most likely do shift work. According to Chang and Chan (2015, 212-213) eLearning is especially convenient in that situation. All of the elements of a good distance and online education presented by Pruikkonen (2012a, 17) are taken into consideration in that they are possible in the eLearning service but not all of them are (e.g. stable and permissive atmosphere) important concerning this thesis.

Learning management systems enable eLearning and make administration of courses easier for teachers and learners. Usually LMSs offer multiple tools for different educational needs. (Chung et al. 2013, 26-27.) With the eLearning service's LMS iSpring Learn managing courses and users is easy and simple because their LMS is well organized and there is no clutter. Their authoring tool works well for making interactive and different kinds of contents such us as surveys, exams, videos, conversation exercises and study materials, which are all in the interest of Corporation X.

Rojas (2016) and Laskaris (2014) agree that an LMS should be usable. That is why it was important that the LMS of the eLearning service is usable to users and administrators. Reiss (2012, xviii) has divided usability into two sides: ease of use, and elegance and clarity. Both of these are entailed in the eLearning service as iSpring Learn does not have any additional unnecessary features and therefore is simple and non-confusing. The usability of the eLearning service could and should be further tested by gathering more information by doing user research (Curedale 2016, 4) and usability testing (Goodman et al 2012, 11). When talking about usability in online services human-computer interaction is an important concept, because it studies people's interaction with computers (Rouse 2005). Kim (2015, 2) has presented four objectives of a good HCI:

functional completeness, compelling user experience, aesthetic appeal and high usability. In the eLearning service these need to be further tested from the user's perspective, but from administrator's perspective the author (who is also the administrator) of the thesis states that the usability and aesthetic appeal of the service are good and in accordance with the requirements presented in subchapter 5.2.

The reasons for implementing observation as a method in the thesis were based on the motives presented by Huttu (2014, 18) and Goodman et al. (2012, 216); interviewing was not a suitable method, the users' imagination on eLearning would most likely be limited, the author and developer of the service needed to understand the working conditions of the users and because there were many assumptions but no certainty regarding certain phenomena. Huttu (2014, 20-25) proposes familiarizing oneself with the topic and composing a list of things needed to be observed. The observer familiarized herself with the topic by conversing with Corporation X's employees about wood product manufacturing and made a list that is illustrated in subchapter 4.3.

The drivers and requirements are consistent with the categories presented by Foreman (2013). The strategic, operational and technical drivers, as well as the functional, technical and cost requirements are the key concepts in evaluation and selection of LMSs (Foreman 2013). These were heavily implemented in the evaluation and selection process of the LMS for the eLearning service and therefore the selected LMS iSpring Learn is a result of a systematic selection process and justifiably the most suitable option for Corporation X.

6 CONCLUSION

Providing industrial services is necessary for manufacturing companies to keep up with the global competition. The eLearning service is a way for Corporation X to provide their training services with great accessibility and effectivity. This thesis combines the development of industrial services and digitality which gives it novelty value and gives Corporation X an advantage against competitors. Below are presented three research questions of the thesis and answers to those questions.

How can Corporation X create value for the customer through eLearning as an industrial service? The eLearning service needs to meet the needs of the customers. The steep learning curve caused by industrial internet makes continuous employee training more important for Corporation X's customers and therefore requires a training service. As Corporation X's customers are situated in all parts of the world, eLearning makes the training easier and cheaper for customers and for Corporation X. Through eLearning the customers' employees can access the training materials anywhere at any time, which eliminates the needs for scheduling the training sessions with Corporation X which then eases the training of new employees. An impractical LMS will not be used by the customer and therefore it will not render value, so to make the eLearning service produce value to the customer, the correct LMS regarding Corporation X's and customers' needs must be chosen. The selection of the correct LMS is a systematic process that includes analyzing needs through strategic, operational and technological drivers and defining the functional, technological and cost requirements which guide the selection of the LMS. Value creation of through eLearning is simple: eLearning with the correct LMS gives the customers value by making their employees better at their job in an easy, effortless and accessible way.

How to develop a usable eLearning as an industrial service? First, understanding the users is important. That is why an observation of the users of the eLearning pilot was performed. Secondly, the eLearning service needs to be developed with the users and administrators in mind,

which includes systematic evaluation and defining the needs and requirements for a usable LMS and then finding an LMS that meets those requirements. Thirdly, the LMS needs to be set up and tested. In this case the LMS was tested by the author from the administrator's and user's perspective as there was not a possibility to use people who reflect the user base. The customer perspective of the LMS can be illustrated and analyzed by using user profiles, customer journey maps and service blueprints. By using them, it is easier to visualize and grasp the problems of an intangible service.

How to mass customize an industrial service? It is imperative to examine the internal and external conditions and ponder whether mass customization is necessary and offers a suitable method for the business company. If so, a correct approach must be chosen: cosmetic, adaptive, transparent or collaborative approach. Then the parts of the service must be identified and it needs to be decided which parts are customizable for the customer and which are not. The whole production process of the service must be transformed from a systematic process to units. This kind of modular design gives the supply network the flexibility it requires to be effective.

6.1 Evaluation of validity, reliability and reproducibility

Qualitative research's validity refers to whether or not the research is carefully executed and the results and conclusions are correct (Saaranen-Kauppinen & Puusniekka 2006a). Kirk and Miller (1986, 41-42, according to Saaranen-Kauppinen and Puusniekka 2006b) divide the reliability of qualitative research into three parts: quixotic reliability (reliability of the method), diachronic reliability (permanence of results regarding time) and synchronic reliability (permanence of results regarding device). Reproducibility refers to when a new research is executed imitating the conditions of a previous research there should be almost no difference in the results. Often irreproducibility is due to sloppiness in experimental design, documentation and execution. (University of South California

2016; Nosek 2015.) To be able to reproduce the research, it must be documented transparently (Shaw, Moore, Noor & Ritchie 2016).

The results of the observation are most likely valid, as the results have been supported by conversations in the workplace. The observation tables assure that the observation was carefully prepared and that it is easy to reproduce. The first day of the observation is not as easy to reproduce, as the machinery were unintentionally on halt and the training facilities can vary according to factory. The reliability of the observation could be better, as the training was observed for only 2 hours from an 8-hour training day, so the 2 hours that were observed can differ from other parts of the training (quixotic reliability) and the observer was visible to users (synchronic reliability). The observation has been tried to depict through words as well as possible, but pictures and videos would have helped transparency and information regarding the observation would have been easier to share.

The selection and evaluation of LMSs was based on a five-step plan by Foreman (2013). Following the plan assured that the research is carefully planned and the use of a clear scoring system validates the results. It is important to remember that the scores are based on a subjective experience of demo versions. The research has quixotic reliability as the requirements used in the evaluation include the basic building blocks of any LMS. Diachronic reliability is poor, since the LMSs are updated and technology develops constantly. The results can differ when executing the research for example via mobile phone, because some LMSs may have invested more in mobile versions (synchronic reliability). Reproducing the research should be possible. Some requirements may differ a bit depending on the intention of the LMS, but the spreadsheets provide a good frame for the evaluation process. The results may differ depending on the researcher's age, knowledge on LMSs, intended use of the LMS, IT skills and online education experience.

The thesis can be considered valid, reliable and reproducible as the process has closely followed Alam and Perry’s (2002, 525) new service

development model. The thesis would have had more validity if more user research and user testing were implemented. The intent was to study users through surveys (appendices 4-5) and study the usability of the eLearning pilot by a micro-usability test (appendix 3), but due to time constraints on the part of the thesis and prolonged pilot, these methods were not implemented.

6.2 Evaluation of the thesis process and learning

Industrial services caught my interest during the last year of my studies, so I decided to focus the remainder of my studies towards industrial service development. When the thesis process started in spring 2016, I did not have an employer for the thesis but I had a clear direction towards industrial service development. I started researching and contacting industrial companies and in the summer I found Corporation X, who had started their eLearning pilot and needed to develop the pilot to a commercial service. In August I started my practical training at Corporation X and specified the subject for the thesis.

The thesis process advanced at a steady pace. As I combined it with my practical training and the eLearning pilot, the thesis process proceeded the same rate as the pilot did. This had pros and cons; a pro was that I was forced to do the thesis from the early on and therefore I did not have to hurry with the thesis towards the end. A con was that I had to follow the schedule of the pilot which showed for example in that the usability testing was done in the later stages of the thesis process and that because of the prolonged deadlines of the pilot I was not able to conduct the survey I had already prepared.

I would have liked to conduct more user research and usability tests. I would have especially liked to do a survey for the users to understand them better, and to test the eLearning service that was the outcome of this thesis. Unfortunately, schedule-wise it was not possible. The biggest conflict of the thesis process and the pilot was that my thesis process ended months before the pilot. From the pilot’s surveys and analytical

reports I could have gathered quantitative data to be analyzed in this thesis.

The thesis process was an educational and inspiring experience. With it I have gained more knowledge on the development of industrial services, eLearning, usability and different development methods. My English vocabulary has expanded and I have learned important professional terms and concepts in English. My critical thinking has improved due to an extensive research for the theory part of this thesis.

6.3 Two steps for Corporation X

This thesis is limited to one perspective, and is not enough to launch the service in its entity. However, this thesis has taken important steps towards the ultimate service and made critical observations for the future development. For developing the service after this thesis, the most important step for Corporation X is to train their employees on using the eLearning service and understanding its value for customer. The service should also be productized and marketed to make it more desirable and create awareness among the customers.

The first step is productizing the eLearning service to make it easier to sell. It helps making the service more understandable for everyone. Giving the service a name and a brand it is easier for the customer to imagine the service. Branding creates an image of the service and differentiates it from other similar solutions and helps in keeping up with the competitors. This will help not only customers to understand it, but also Corporation X’s employees.

Second step is to introduce the new service at Corporation X. When Corporation X’s employees know the service and see its value, they are more confident in selling it and are less reluctant to discuss about it with customers. For example the sales and marketing departments should be required to know the essentials of the service. The sales people need to be trained in selling the service; they should have a basic knowledge of

the service and its functions, so that they can present it and answer confidently to any hesitations from customers. The marketing department is essential for getting the new service in to a wider audience's attention and developing Corporation X's image as a forerunner in their field.

As service development is a continuous process that requires change process management (figure 27), user testing and analysis should be done continuously and in cooperation with customers. Customers' needs and requirements change and it is necessary for Corporation X to be up to date on what the customers want. This way eLearning will yield value for the customer and be a successful service.

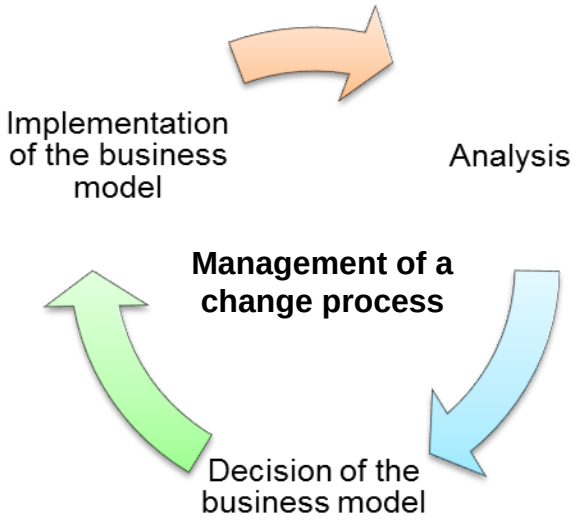


Figure 27. Development process of service business (Martinsuo & Kohtamäki 2014, 12)

Corporation X needs to invest in personnel resources for managing the eLearning service, researching the users, doing usability testing (as it should be done continuously) and developing industrial services further. This way, Corporation X will implement the findings discovered in this thesis and develop their technological services systematically and effectively.

6.4 Research ideas for the future

In this thesis developing eLearning as an industrial service has been looked at from the perspective of user-oriented service development. As explained before, the subjects of pedagogics and content were not regarded in this thesis. However, these subjects should be studied for developing the eLearning-service further. Along with these subjects, eLearning should be studied in use.

From a pedagogical perspective, the subject of motivation should be studied. What motivates this kind of user base? How can the LMS platform be motivating from user's perspective? What should the layout of the LMS be like to be motivating and support learning at the same time? What kind of teaching methods this kind of user base responds to?

The content on eLearning should be motivating and educational about the wood product manufacturing process. Wood product manufacturing experts rarely have pedagogical knowledge enough to make studying materials motivating and educational at the same time and specialists of education do not understand the complexity of the wood product manufacturing process, so who should produce the content? Should it be done in co-operation with professionals from different fields? Should the knowledge come from inside the corporation or should consultants be used? In what form should the content be? Different factories' wood product manufacturing processes and machinery differ from each other, so how to make the content profitable (meaning content should not be done from scratch for every client) and still be equivalent towards customer's needs? In other words, how can the content be mass-customized?

Once the eLearning service is launched, the use of it should be studied from the user's and service provider's perspectives. Are the users excited and motivated to use it? Do the users know how to use it and find what they are looking for? Do the administrators know how to use it and find what they are looking for? Is there anything that the users are looking for but is not there? Is there anything that the administrators are looking for

but is not there? Do the users reach their goals by using the eLearning-service? Does Corporation X reach their goals regarding the eLearning-service? By asking these questions, the effectivity of the service can be examined.

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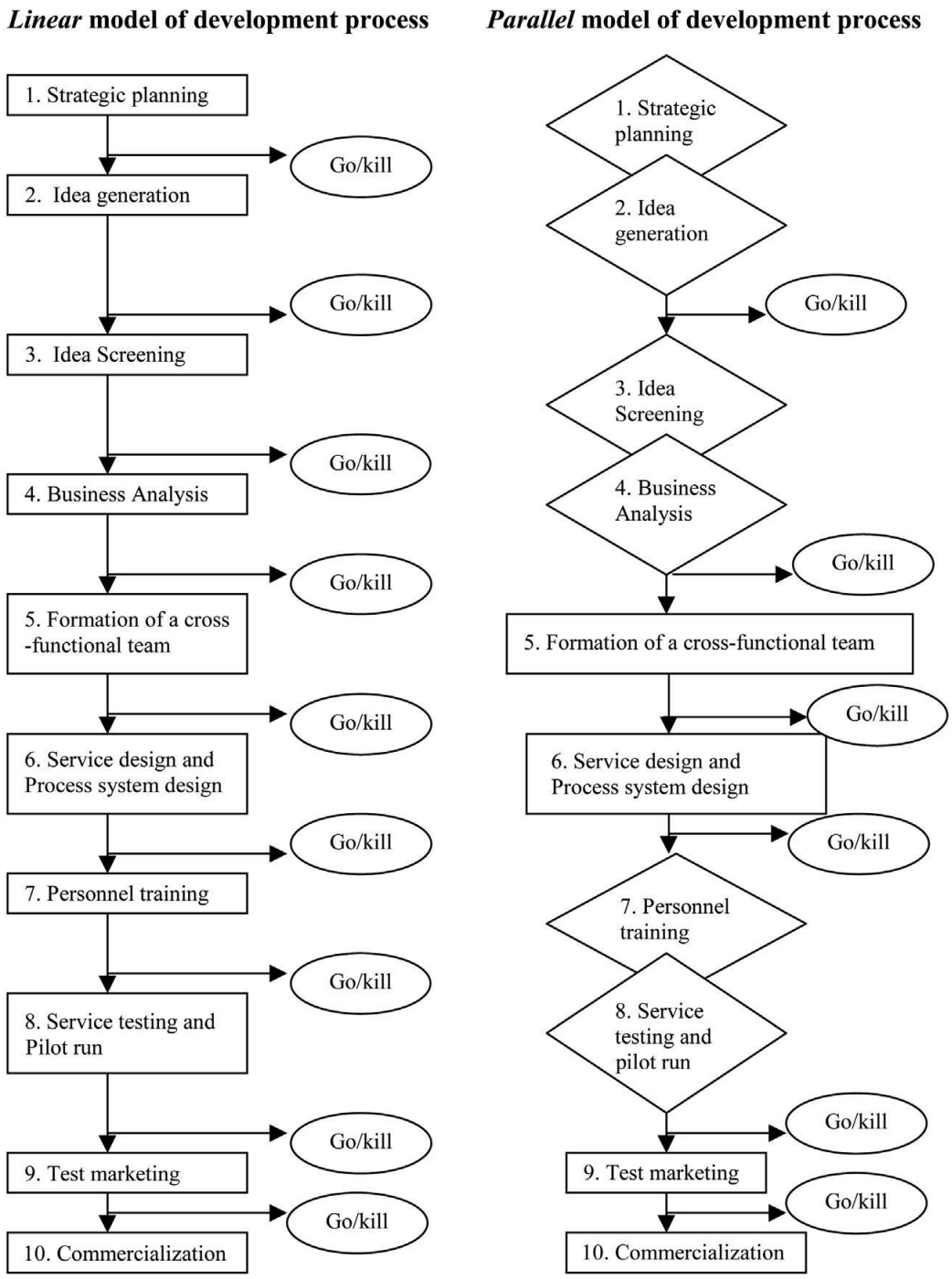
APPENDICES

Appendix 1. Alam and Perry's (2002, 525) NSD model



Key: *Rectangle box*: sequential stages; *diamond box*: overlapping/parallel stages

Appendix 2. Usability test plan Dashboard

AUTHOR

CONTACT DETAILS

FINAL DATE FOR COMMENTS

PRODUCT UNDER TEST

What's being tested? What are the business and experience goals of the product?

TEST OBJECTIVES

What are the goals of the usability test? What specific questions will be answered? What hypotheses will be tested?

PARTICIPANTS

How many participants will be recruited? What are their key characteristics?

TEST TASKS

What are the test tasks?

RESPONSIBILITIES

Who is involved in the test and what are their responsibilities?

BUSINESS CASE

Why are we doing this test? What are the benefits? What are the risks of not testing?

EQUIPMENT

What equipment is required? How will you record the data?

LOCATION & DATES

Where and when will the test take place? When and how will the results be shared?

PROCEDURE

What are the main steps in the test procedure?

Appendix 3: Micro-usability test

1. Log in to the site by using your user name and password. Then change the password to something more personal to you.
2. Answer to the starting survey. Then find the drying course for maintenance personnel.
3. Open the drying course's studying materials. Read the materials and return to course site and perform the exam.
4. You want to give feedback about the course. Find the end questionnaire and respond to it. After this, log off from the web site.

Appendix 4: Survey in the beginning of eLearning

Start-Up Questionnaire								
	Question	Answers						
1	Age	18-34	35-50	51+				
2	Sex	Male	Female					
3	Have you studied online before?	Yes	No					
4	Yes --> Do you prefer studying online, in practice or in a classroom?	Online	In practice	Classroom				
5	Yes --> How much do you like online studying?	1= Not at all	2= Not that much	3= Very little	4= Some	5= A lot	6= Very much	
6	No --> Why have you not studied online before?	It seems too difficult	I don't really know what it is or how it works	I don't own a computer	I've never had an opportunity to try it	Other		
7	No --> How interested are you to try online studying?	1= Not at all interested	2= A bit interested	3= Interested	4= Very interested			
8	What is your latest education?	Basic education	Secondary education	Secondary special	Vocational secondary education	Higher education	Bachelor's degree	Master's degree
9	How long have you worked at your current job?	0-3 months	3-6 months	6-9 months	9+ months			
10	What do you feel like is your current competence level in your job?	1= Beginner	2= Not that competent	3= Competent	4= Professional			
11	If you would set goals for your online studying, what would they be?	To be better at my job	To do it because I have to	To understand my field better	To be better at online studying	Other		
12	How much do you expect this course to benefit you in your job?	1= Not at all	2= Not that much	3= Very little	4= Some	5= A lot	6= Very much	

Appendix 5: Survey at the end of eLearning

End Questionnaire								
	Question	Answers						
1	Age	18-34	35-50	51+				
2	Sex	Male	Female					
3	How long have you worked at your current job?	0-3 months	3-6 months	6-9 months	9+ months			
4	What is your latest education?	Basic education	Secondary education	Secondary special	Vocational secondary education	Higher education	Bachelor's degree	Master's degree
5	Had you studied online before this course?	Yes	No					
6	How would you preferably study?	In a classroom	Online	In practice				
7	How easy to use did you find the learning environment to be?	1= Very hard	2= Hard	3= A little bit hard	4= OK	5= Easy	6= Very easy	
8	How useful did you find the internet training materials to be?	1= Very useless	2= Useless	3= A bit useless	4= A bit useful	5= Useful	6= Very useful	
9	How would you rate the timeline of the examination?	1= Too short	2= Short	3= Relatively OK	4= Fine	5= Good	6= Very good	
10	What would motivate you to study online more?	Better platform	More interesting subject	Rewards (money etc.)	Gamification	Evolving myself	Better courses	
11	Would you like to learn by playing games?	1= Never	2= No, I would not	3= Not really	4= Maybe	5= Yes, I would	6= Definitely	
12	Would you like to learn by Power Point lectures?	1= Never	2= No, I would not	3= Not really	4= Maybe	5= Yes, I would	6= Definitely	

13	Would you like to learn by reading manuals and instructions?	1= Never	2= No, I would not	3= Not really	4= Maybe	5= Yes, I would	6= Definitely	
14	Would you like to learn by watching videos?	1= Never	2= No, I would not	3= Not really	4= Maybe	5= Yes, I would	6= Definitely	
15	What kind of equipment would you rather use for learning online?	Computer	Tablet	Mobile phone				
16	In your opinion, how much has this course benefitted you in your job?	1= Not at all	2= Not that much	3= Very little	4= Some	5= A lot	6= Very much	
17	In your opinion, what is your current competence level in your job?	1= Beginner	2= Not that competent	3= Competent	4= Professional			
18	Did you achieve your objectives regarding this internet training program?	Yes	No	I did not have any objectives				
19	Would you like to use this internet training program again?	1= Not at all	2= Maybe	3= Yes	4= Very much so			
20	How was your experience studying online?	Horrible / Amazing	Boring / Fun	Difficult / Easy	Bad / Good	Inconvenient / convenient		
21	Feedback / improvement ideas?							

Appendix 6. The observation tables

Observation of users					
Age	Millenials	40+			
Sex	More males	More females			
What are they doing?	Standing	Walking	Sitting	Working	Laying down
Are they busy?	Not at all	A little	Yes, they are busy	Very busy	
Socializing	No socializing	Little socializing	Some socializing	A lot of socializing	
Motivation	Excited	Tired	Laughing	Serious	
Use of technology	Phone	Computer	Tablet	Nothing	
Does anyone have any of devices the above?	Phone	Computer	Tablet	Nothing	

Observation of facilities	
Atmosphere	Hard working and lazy at some points
How big of a process?	A big process, but very automated. The facilities are quite big, so from one place to another the distance can be bigger than usual
How many lines have a worker? (Automation)	Every line that was working at the time had at least one
How many workers per a line?	Most of them had one worker per line, but a few lines had multiple workers
Is there a possibility to study?	Possibly in the break room. Besides their breaks there is not too many possibilities to take their focus off of the line
Is there a possibility to have technological devices?	To have yes, to use no

Observation of training					
Studying facilities?	Poor	Ok	Motivational	High-end	
Studying methods?	PP	Word	Video	Games	Materials
Are there exams?	Yes	No			
Interactivity with the students?	Not at all	Little	Some	A lot	
Motivation?	Tired	Excited	Careless	Interested	
Activity?	Asked questions	Just listened	Talking to trainer	Talking to each other	
What are the students doing?	Listening	Playing with their phones	Reading	Sleeping	
Use of technology?	Phone	Computer	Tablet	Nothing	

The hypotheses that came true during the observation are marked yellow.

Appendix 7. LMS vetting

Organization	€	Operating system	+	-
Discendum	Depends on the functions needed	Optima	According to their website: + Hosting, software updates, data security, technical support, training consultation, integration services. + Easy to modify. + Discendum has many universities (of applied sciences) as a reference. + Simplicity.	- Old and boring appearance - Not motivating
Discendum	Depends on the functions needed	Totara	According to their website: + 24 languages. + Mandatory learning, individual goals can be set. Made for enterprises for their employees to develop themselves. + Integration to other systems.	- Too many unnecessary features for this purpose - Looks to be like a more comprehensive and colorful version of Moodle
Metaverstas	Depends on the functions needed	Game-based learning	+The game aspect makes the studying more interesting and easier to get the employees study on their own time. + The students could actually see the machinery and facilities; get a more life-like feel of them than on a computer. + If done as VR, possible to "walk around" in the facilities and test the machinery	- Expensive to produce the game and for the customer to buy the equipment (VR would be best for this). - Might be harder to mass customize the game, since it would be difficult to change something in it. - Difficult to convince clients of the training's necessarity

Valopi	Depends on the functions needed	Moodle	+ Popular, widely used platform + Has all of the necessary features. + Most of the features are easy to use when there isn't too much information on the platform.	- Their own website looks old - With many components, it becomes confusing and scattered from user's perspective - Making exams and questionnaires take a lot of time, and even though there are many different types of questions, the features of the questions are not thought all the way through.
Docebo	350users/440€month/4400€/year	Docebo	+ Room to grow and develop eLearning, e.g. if wanted a social aspect + Easy platform to use, modern and customizable (white labeling). + Awarded with best LMS 2016 + Dozens of languages where to choose from.	- Has many unnecessary features for Corporation X's use --> confuses the user
Quizworks	99$/month	Easy-lms	+ The exams and quizzes look fun as does the visual appearance + Easy to add your own pictures to the background of the materials and exams.	- Not easy enough to use. - Opens the course in to a different window every time, and takes a while to figure out where's the exit. - Not very versatile & not enough language options.
Cypher Learning	0,60$/student/month + tax	NEO	+ Seems to be OK and simple to use. + From the users perspective it looks (in the photos) to be so simple, everything you need in one sidebar.	- The platform designed for schools - Has unnecessary features for our purpose.

Cypher Learning	Price depends on student count, for example 1000 students / 809$ / month	Matrix	+ Designed for corporate use + Modern, looks good + Simple, easy to use for users and for admin. + Gamification	- There are some features that are unnecessary, and might be suited better to educate your own employees (for building a career). - Too few choices for the questionnaire - Not possible to see in the demo what kind of analytics is possible to get.
Media-Maisteri	Depends on the functions needed	Moodle	+ Popular platform. + Exams and questionnaires look good. Many options on how to do them. + Has many features and has a guide site. + Easy to view the user's perspective	- Old and stiff platform. - With many components, it becomes confusing and scattered from user's perspective - Making surveys takes a lot of time, and even though there are many different types of questions, the features of the questions are not thought all the way through. To make exams quickly they must be encoded.
iSpring Solutions	iSpring Suite, 3 licences (lifetime) + support (1 year) 1 585€, iSpring Learn (LMS) 6 970€/year/500 users	iSpringLearn	+ Exams, questionnaires, materials can be put in power point which converts them easily to HTML5 with a built-in tool. + Easy to use + Great customer service (HelpDesk). + Platform works very well, it is simple to use from user's and admin's perspective. + (with the app) iSpring can be viewed even without internet connection.	- Must be bought with add-ons. - Not possible to have a return box for assignments, need to put an essay answer at the end of a quiz if wanted the user to return a task

Appendix 8. Closer examination of LMSs

	Docebo	**Moodle**	**Matrix**	**Easy-LMS**	**iSpring Learn**
General	Has won the award for best LMS 2016.	Popular platform.	Has gotten good reviews on the internet.	Has gotten good reviews, but from companies/people with different purposes than Corporation X.	To have all the necessary features, add-ons must be bought.
Platform appearance	Modern, customizable. Whitelabeling possible.	The platform looks and feels old. Does not give a modern impression of Corporation X. Whitelabeling possible.	Modern. Simple from the user's perspective.	Too cute of an appearance. The functions' appearance is fun, but not suitable for Corporation X's purpose.	Modern and simple. Customizable appearance, possible to whitelabel the platform.
Usability	*Admin perspective*: Possible to hold webinars with Adobe. Different functions easy to find. *User perspective*: Easy to move around and exit buttons are easy to locate.	*Admin perspective*: Platform is very stiff; it is not possible to place everything where you want to. Has all the necessary buttons for messages etc. Some things are easy to modify, others really hard. *User perspective*: Hard to exit HTML5 materials. Easy to view the platform.	*Admin perspective*: Easy to use. Possible to create competitive games. Not possible to view the whole platform as a learner. Has all the necessary buttons for messages etc. *User perspective:* The platform's "previous" button takes you to another file, not to the module overview.	*Admin perspective*: Not enough functions. Difficult to see what the whole course looks like for the user.	*Admin perspective*: Easy to use. To make quizzes etc., an add-on is necessary, but it works well in Power Point. All of the quizzes and materials will be in Power Point form which looks good and works well. *User's perspective*: Easy to use, no necessary features shown and clear paths where to go.

Surveys	There is a good amount of choices: Likert scale, multiple choice, open choice etc. Not possible to make a question dependent on an answer.	Moodle does not provide scale where explanations can be embedded into correct places and answering can happen by a single tap.	No possibilities to do any other types of questions that multichoice and free text. Does not work for Corporation X's needs.	Not possible to make traditional surveys just for gathering information about the users. Only exams and surveys that have a scoring system	Easy to do with the authoring tool. Possible to route the user based on his answer, and the survey looks modern. Many different question options where to choose from.
Exams	Easy to do and respond to.	The exams work fine and look good. Not motivating or modern but simple and easy to do. Possible to get pictures as answers. Many different types of questions, but in some type of questions you have to encode the question yourself, which is quite slow.	Exams work fine from admin perspective, there could be a bit more options for question types. Difficult to see from user's perspective.	There are only a few different kinds of question types. Photos can be embedded into answers. The exam itself looks fun from a user perspective.	Simple to do with the authoring tool and look similar to surveys. Lots of different options for questions, and easy to add in pictures. Exam opens in an additional window, which shows one question at a time PowerPoint-style.
Course management	Courses look modern and there can be added a photo to depict the course. Possible to add an assignment straight to the platform, but the user must answer with a document. Possible to get power points integrated to the platform so that they don't have to be downloaded by users.	Courses look a bit old and are hard to manage. To make materials that do not need to be downloaded must be in HTML 5 form. Different options to make a course.	Possible to get extensions/web tools. Making courses is confusing and difficult.	All content must be done by hand, as there is no sight of an uploading possibility. The course view is like the exam view. Makin courses is difficult and time consuming.	Possible to make learning paths, which can be useful. In the path would be all of the courses they need to pass. Possible to comment on courses. Users cannot return assignments to the platform. Assignments must be submitted as an essay form at the end of a quiz.

Links	Links can be put to an assignment.	Links can be put to an assignment.	Can be added as own text where it turns into a hyperlink (behind a title), seems workable.	As a text it looks to be possible.	Possible to put a link like a course, when you press start course, it takes you to the website directly.
User management	Users can be managed as a group or separately. Gamification feature, where users can collect points and compete against each other. Users can be enrolled separately or as a group.	Users can be managed as a group or separately and followed. For a more social experience, it is possible to create groups, where to discuss etc. Users can be added as a group, or users can enroll themselves.	Users can be managed as a group or separately and followed. There is a possibility for gamification and tracking your own progress. Gamification feature is hard to comprehend. For a more social experience, it is possible to create groups, where to discuss etc. Enrollments can be done as a group or given a password to the user.	There is some kind of gamification for users, but from the demo it is hard to comprehend. Enrolling happens through invitations (email), No option for group enrolling in sight.	Possible to manage users as groups, and contents can be shown to just a specific group. No gamification. Possible to enroll users in a group (excel) or separately via email. Email is used for enrolling. Users can be managed as a group or separately.
Analytics	Every user should be able to see an analysis of their own functions, such as progress and points. Admins can see very specific data. It can be filtered (e.g. through a specific question) and can be gathered in to excel (in the correct way).	Collects correct/incorrect answers, but not much else data can be found (at least not easily). Data can be imported into excel.	The LMS says that there "are no participants on the course", so it is not possible to see what kind of data it collects.	Reports can be viewed per user, but it is unclear what kind of data can be gathered.	Lots of reporting options. For example shows quiz failure percent, what questions were answered wrong etc. Data can be filtered and imported into excel.

Service provider	24/7 HelpDesk, offers many integrations for a price. There are videos and guides for FAQs. Helpdesk answered questions in a few days.	Personal support (in Finnish) and there is a quite comprehensive Moodle learning site where to get information from.	Gives information on updates, has a helpdesk, where there are collected a lot of FAQs and answers.	Offers a help desk (chat) and has little question boxes along the platform	Offers 24/7 support, other users have complemented the support. Respond time is faster during office hours (US). Also has tutorials, FAQs, videos to help. When tested the support service, question was responded within a couple of hours.
Platform lay-out	Is logical and finding features is easy. The lay-out is at some points a little confusing due to many (unnecessary) features.	Lay-out is very stiff, and not all activities can be put into places where they would be more usable. When activities are to a minimum the lay-out is neat and clear, but when adding activities it becomes confusing.	Lay-out looks good at first, but when using it, it is discovered that it could be a bit more functional.	Strange lay-out that is not easy to use. Does not seem logical. Lay-out (and entire LMS) is probably designed for children.	Lay-out looks good and logical, the platform is quite stiff, but there are not that many places where it needs changing.
Navigation	Offers a "home" button and a sidebar where user can move around. Displays courses on the first page.	Offers a "home" button, but an arrow backwards does not take users backwards but to the course site, which is not suitable for Corporation X's use. Displays courses on the first page.	Offers a "home" button. Displays courses on the first page. There is a sidebar which is used for navigation.	Offers a "home" button. There is a sidebar and an upper bar which is used for navigation.	Offers a "home" button. Displays courses on the first page. Easy to move around. There is a sidebar which is used for navigation.
Language options	A lot of options for language.	Only a few language options.	A lot of options for language.	Only a few language options.	A lot of options for language.

Accessibility	Computer, tablet, mobile.	Computer, tablet, mobile. Not all of the materials can be viewed in mobile.	Computer, tablet, mobile.	Computer, tablet, mobile.	Computer, tablet, mobile. (With the app) iSpring can be viewed even without internet connection.
Ability to handle increasing number of users	If the user count goes over the agreed amount, must pay per additional user.	It will cost more but it is possible to have thousands of users.	Pricing goes up to 20 000 users.	Pricing goes up to 50 000 users.	Pricing goes only up to 800 users.
Ability to be easily modified	A lot of things can be modified easily, but there are lots of things that can be modified by admin at all.	Features and platform can be modified, but not easily.	Not easy to modify anything.	Not easy to modify anything.	A lot of things can be modified easily, but there are lots of things that can be modified by admin at all.

Appendix 9. LMS scores

Platform appearance	3	2	3	2	3
Usability	4	3	2	2	4
Surveys	4	2	1	1	4
Exams	4	3	2	2	4
Course management	3	2	2	1	4
Links	2	2	2	2	3
User management	4	4	3	2	4
Analytics	3	1	1	1	4
Service provider	2	3	2	2	4
Platform lay-out	3	2	2	1	4
Navigation	4	2	2	2	4
Language options	4	1	4	1	4
Accessibility	3	2	3	2	4
Ability to handle increasing number of users	2	2	3	4	2
Ability to be easily modified	3	2	1	1	3
Average value	3,2	2,2	2,2	1,7	3,7

Appendix 10. User profile of Helen Fischer

Helen Fischer

PROFILE

GENDER Female
AGE 31
LOCATION Small town in Germany
OCCUPATION Industrial worker
FAMILY Husband, 2 children
EDUCATION Primary school
HOBBIES Gardening, watching TV

MOTIVATIONS

INCENTIVES Promotion
ACHIEVEMENTS Employee of the month, employee in the same company for 10 years
PERSONALITY Friendly, quiet,

GOALS

Helen wants a better job with better pay to provide a better life for children. As she was not able to educate herself further due to her pregnancy when she was young, she wants now to be more educated.

FRUSTRATIONS

Helen hates if her work goes unrecognized by the boss. She does not like feeling stupid, which is why she rarely tends to speak up in front of a lot of people.

ATTITUDES

EDUCATION

TECHNOLOGY

TESTS

BELIEFS

EDUCATION IS HARD

TECHNOLOGY IS HARD

TESTS ARE HARD

Appendix 11: User profile of Tomás Garcia

Tomás Garcia

PROFILE

GENDER Male
AGE 19
LOCATION Town with less than 100,000 citizens in Spain
OCCUPATION Industrial worker
FAMILY Single
EDUCATION High school
HOBBIES Friends, playing video games

MOTIVATIONS

INCENTIVES Salary
ACHIEVEMENTS None
PERSONALITY Witty and lazy

GOALS

Tomás wants a different job from a different company. He does not know what kind of job he wants but he wants to make good money.

FRUSTRATIONS

Does not like his current job. Tomás thinks that it is boring and pointless. He does not like authority figures, and hates when he is corrected.

ATTITUDES

EDUCATION

TECHNOLOGY

TESTS

BELIEFS

EDUCATION IS HARD

TECHNOLOGY IS HARD

TESTS ARE HARD

Appendix 12: User profile of Arvi Paasuke

Arvi Paasuke

PROFILE

GENDER Male
AGE 59
LOCATION Estonia's capital
OCCUPATION Industrial worker
FAMILY Wife, 4 grown children
EDUCATION Primary school
HOBBIES Watching TV

MOTIVATIONS

INCENTIVES Providing for his wife
ACHIEVEMENTS Employee in the same company for 40 years
PERSONALITY Serious, does everything needs to be done, takes pride in his work

GOALS

Arvi has had the same job for 40 years. He is looking forward for retirement but also wishes some kind of recognition from his employer.

FRUSTRATIONS

At his age, he believes that he does not need to learn anything new.

ATTITUDES

EDUCATION

TECHNOLOGY

TESTS

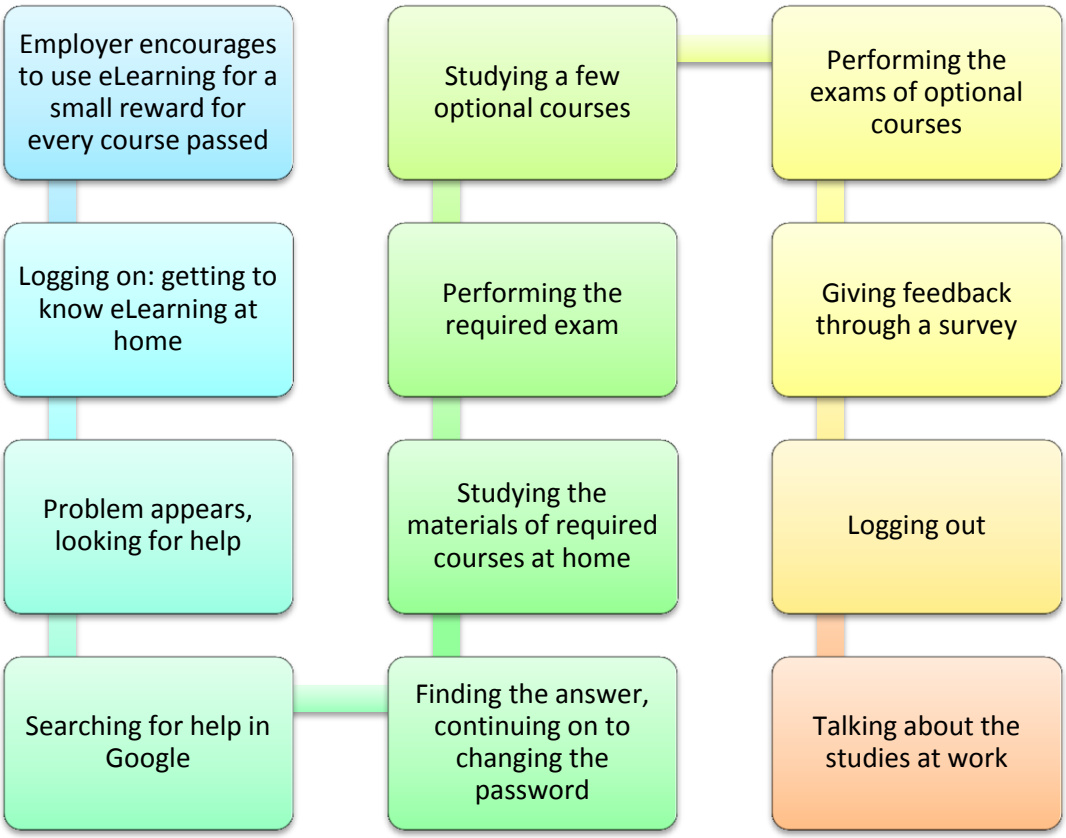
BELIEFS

EDUCATION IS HARD

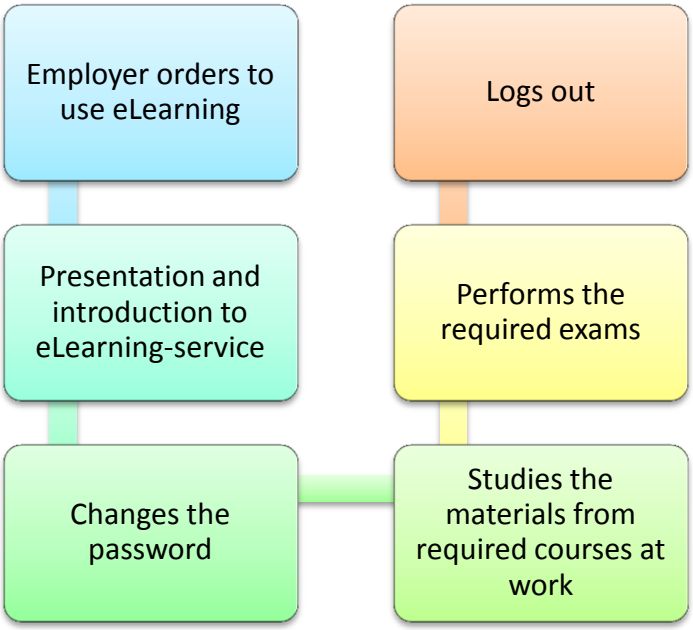
TECHNOLOGY IS HARD

TESTS ARE HARD

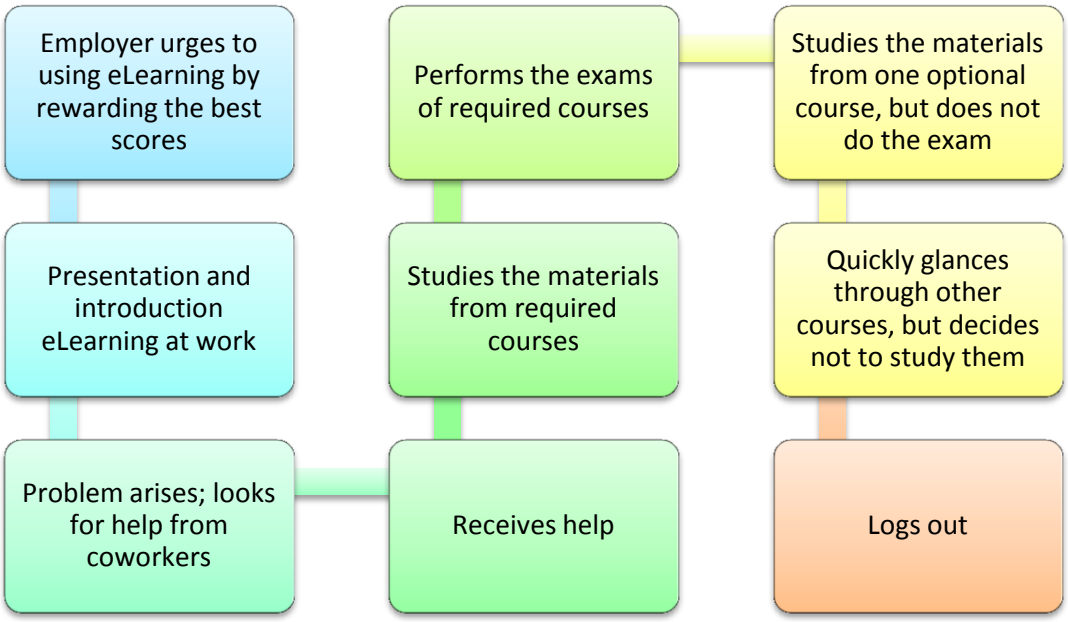
Appendix 13: Customer journey map of Helen Fischer



Appendix 14: Customer journey map of Tomás Garcia



Appendix 15: Customer journey map of Arvi Paasuke



Appendix 16: Service blueprint of the eLearning servic