



Designing a Supplier Portal Concept for Product Information Management Using a User- Centric Approach

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Designing a Supplier Portal Concept for Product Information Management Using a User-Centric Approach

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The digital era has revolutionized the retail business environment, where digital product information has become the enabler for various business activities. The rise of e-commerce is one of the main drivers for companies to invest in product information management systems and processes as it sets high requirements for product information quality and consistency. Retail supply chain actors share product information between each other as a part of their business actions, but they also have different product information related requirements, systems, and practices. This results in practical challenges and manual work when product information needs to be shared between organizations. On the other hand, intentional differentiation of product information such as search engine optimization (SEO) can also be used as a source of competitive advantage.

This thesis was commissioned by a Finnish-based trading company. The purpose of this thesis was to improve the fluency of product information sharing in the supply chain between product suppliers and the case company. The objective was to design a concept for a supplier self-service portal for product information management and to identify Minimum Viable Service requirements. The theoretical framework of this thesis consists of Service-Dominant Logic, Service Logic, and value creation in service process. Design thinking, service design and user-centered design are discussed.

The empirical part of the thesis is a case study, which utilizes design thinking, service design methods and user-centric approach in digital service development. The empirical process follows the Double Diamond design process model developed by Design Council. Six employer interviews, six supplier interviews and a focus group with employees were conducted to discover the service context and user needs. A learning story was written to benchmark a previously used system. User needs were crystallized in the form of three user personas. A service proposition was drafted based on the research and refined based on user feedback.

The main empirical outcome is a Service Concept for a supplier portal for product information management, which emphasizes aspects of collaboration. Three service blueprints were drawn to visualize the Minimum Viable Service requirements. Eventually, the process of delivering the design from a concept-level to software developers was established utilizing user stories as a means to document development specifications.

As a result of applying design thinking and focusing on the problem definition in the empirical part of the thesis, the design challenge became refined and user centric. The main conclusion of the thesis was that a supplier portal for product information management could benefit both the case company and the suppliers by facilitating their collaboration in the complex context of product information management and information sharing.

Keywords: product information management, PIM, self-service portal, design thinking, digital service concept

Taika Rantanen

Tavarantoimittajaportaalin käyttäjälähtöinen suunnittelu tuotetiedon hallinnan kontekstissa

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Digitaalinen aikakausi on mullistanut vähittäiskaupan liiketoimintaympäristön, jossa digitaalisesta tuotetiedosta on tullut edellytys erilaisille liiketoiminnoille. Yksi pääasiallisista tuotetietojärjestelmien ja tuotetiedonhallinnan prosessien kehittämisen ajureista on verkkokauppaliiketoiminnan kasvu sen asettaessa korkeat vaatimukset laadukkaalle tuotetiedolle. Tuotetietoa jaetaan myös yritysten välillä osana vähittäiskaupan toimitusketjun sisäisiä prosesseja. Yrityksillä on kuitenkin erilaisia vaatimuksia ja teknisiä järjestelmiä tuotetiedon ylläpidolle, joka asettaa haasteita tiedon jakamiselle organisaatioiden välillä. Toisaalta tuotetietoa myös erilaistetaan tietoisesti esimerkiksi hakukoneoptimoinnin (SEO) avulla, jolloin uniikista tuotetiedosta voidaan saada kilpailuetua.

Tämän opinnäytetyön toimeksiantaja on suomalainen kaupan alan toimija. Opinnäytetön tarkoituksena oli tehostaa tuotetiedon jakamista tavarantoimittajien ja toimeksiantajan välillä. Opinnäytetyön kehitystehtävänä oli suunnitella konsepti tavarantoimittajaportaalin tuotetiedon hallintaan, sekä tunnistaa vaatimukset pienimmälle julkaisukelpoiselle palvelulle. Tutkimuksen tietoperusta koostuu palveluajattelusta ja palvelukeskeisen arvonluonnin logiikasta. Muotoiluajattelu, palvelumuotoilu ja käyttäjäkeskeinen suunnittelu muodostavat viitekehyksen kehittämistehtävän käyttäjälähtöisyydelle.

Opinnäytetyö edustaa tapaustutkimusta sovelluskehityksen viitekehyksessä. Muotoiluprosessina käytettiin Design Councilin kehittämää Double Diamond -mallia. Toimeksiantajayrityksen työntekijöiden ja tavarantoimittajayritysten edustajien käyttäjätarpeita ja kontekstia hahmotettiin haastattelujen ja fokusryhmähaastattelun avulla. Aiemmin käytössä olleesta palvelusta kirjoitettiin oppimistarina. Käyttäjätarpeet kiteytettiin kolmeksi käyttäjäpersoonaksi. Kerätyn aineiston perusteella muodostettiin palveluehdotus, jota kehitettiin edelleen saadun palautteen perusteella.

Muotoiluprosessin tuloksena syntyi tavarantoimittajaportaalin palvelukonsepti, jossa korostuu tehokas yhteistyö. Pienimmän julkaisukelpoisen palvelun palvelumallin kuvaus tehtiin Service Blueprint -menetelmällä. Prosessi palvelukonseptin toimittamiseksi myöhemmin sovelluskehittäjille määritettiin kirjoittamalla tarvittavat käyttäjätarinat yhdelle suunnitelluista palvelumallikuvauksista.

Paneutumalla muotoiluajattelun mukaisesti ongelman määrittelyvaiheeseen, kehitystehtävä tarkentui käyttäjälähtöiseksi. Tutkimuksen tuloksena voidaan todeta, että tavarantoimittajaportaali voi hyödyttää sekä toimeksiantajaa että tavarantoimittajayrityksiä fasilitoimalla heidän välistä yhteistyötään tuotetiedon jakamisen monitahoisessa kontekstissa.

Avainsanat: tuotetiedon hallinta, PIM, muotoiluajattelu, käyttäjälähtöisyys

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1 Introduction

Digitalization has changed the business environment, and digital context is a new locus for marketing activities (Baltes 2016, 33). Digital platforms have become mainstream, and in the 2020's they form the foundation for delivering services across industries ranging from healthcare to financing. Masses of data is being shared to people through different web-based systems, creating both new opportunities for digital services but also problems in terms of how these services can be used by people. (Polaine, Løvlie & Reason 2013, 24.)

Among other industries, retail is revolutionized by digitalization. Product information plays a key role in modern commerce where not only physical products are being exchanged between the supplier and retailer and eventually the end-customer, but digital information about the products is in crucial role (Abraham 2014, 8). The rise of e-commerce in the digital era has especially increased the expectations towards product information, which is visible to customers in various online platforms (Battistello, Haug, Suzic, & Hvam 2021, 1).

It has been studied and proven that there is a correlation between good product information and sales growth (Abraham 2014, 20), which is an incentive for companies to invest in their product information management processes. A specialized software for centralized Product Information Management, a *PIM system*, is often used to serve the need for consistent product information across different channels (Battistello et al. 2021, 1).

As product information has adopted a central role in digital retail, the size of product information management (PIM) as a market is increasing. MarketsandMarkets (2022) forecasts a strong growth: whereas the size of the PIM market in 2022 is estimated to be 12.2 billion (USD), it may reach 23.8 billion (USD) by 2027. The market has also been positively impacted by the Covid-19 pandemic, the pandemic-driven growth of e-commerce as one of the main drivers.

This thesis is a case study of a digital service concept development in PIM system context, and it is commissioned by a case company. The focus is in enhancing the product information sharing processes between the case company and its suppliers. As an outcome of this thesis the foundations for a supplier self-service portal for product information management are designed using a user-centric approach.

The theoretical framework of the thesis explores how service logic theories can be applied to the context of PIM system development, and it analyzes design thinking, service design, user-centered design, and co-creation. The empirical part of the thesis is a design process where user insights are gathered and processed. Based on the findings a Service Concept for PIM

supplier portal is developed. Additionally, the process for delivering the Service Concept further to system developers as a Minimum Viable Service is designed.

1.1 Background of the thesis

The case company and commissioner of the thesis is a Finnish-based trading company operating in several countries. The thesis was done for a business unit located in Finland as a part of a wider product information management (PIM) system development program. Later in this thesis, this system development program is referred to as *the Development Program*.

As was mentioned in the introduction of the thesis, the role of product information has revolutionized in the recent years, especially due e-commerce activities. The case company makes no exception; thus, it is constantly looking for new ways to develop its product information management. This has meant both actively developing the systems and the related processes.

The discussions with the head of the development program started in the fall 2021. It was identified that in the efforts to understand how product information sharing practices between suppliers and case company could be improved, more research was needed. Eventually these conversations formed the purpose and objective of the thesis. The head of the development program is later in this thesis referred to as *Program Owner*.

1.2 Purpose and objective of the thesis

The purpose of the thesis was to improve the fluency of product information delivery process between the case company and its suppliers. As IT development has brought forth a variety of self-service portals as a means for companies to share data and increase efficiency (Wirtz & Lovelock 2018, 10), the business hypothesis of the case company was that a supplier self-service for product information management could offer mutual business benefits through increased process efficiency. By reducing manual efforts and streamlining information sharing related processes using modern technology, time-to-market could be shortened, and data updates could be provided efficiently by the suppliers.

Initially, the objective of the thesis research was to identify pain points in the current product information sharing practices between the suppliers and the case company. The second objective and the desired concrete outcome of the thesis was to design a service concept and identify Minimum Viable Product (MVP) requirements for a PIM supplier portal, which would enable a fluent product information delivery process from suppliers to the case company. Based on the empirical research to be conducted, future development needs could be already placed into the future roadmap of the portal.

This thesis approaches the development task from service thinking view; thus, the definition of MVP (Minimum Viable Product) is reformulated to MVS (Minimum Viable Service).

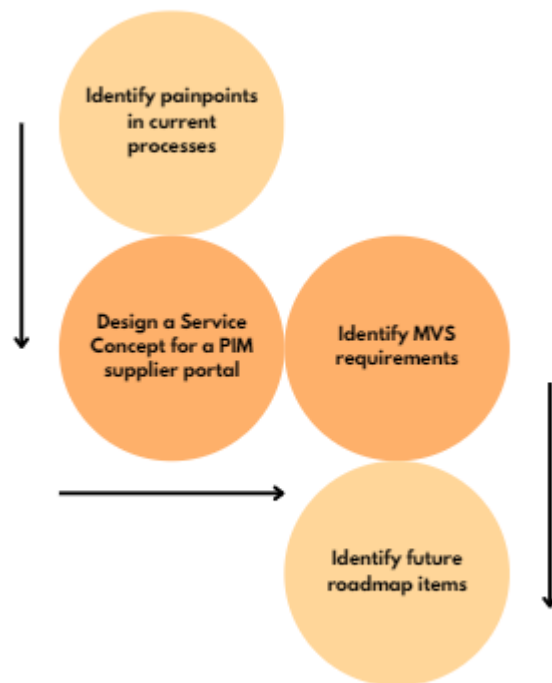


Figure 1: The main empirical goals of the study highlighted in orange

The empirical part of the thesis follows the Double Diamond design process (Design Council 2007). Double Diamond as a design process is described in more detail in chapter 5.1 later in this thesis.

Three guiding questions for the study were determined by the thesis writer:

1. How do we co-create most value with service partners through a digital portal?
2. How do we understand the service context and the future role of the digital portal in it?
3. What needs could be met in MVS, and how should we prioritize the needs in MVS and project roadmap?

1.3 Structure of the thesis

In the previous chapters the background, purpose and objective of the thesis were discussed and the guiding questions for the thesis were introduced. In the next chapters, product information management (PIM) as the thesis context is discussed. As the thesis has service

viewpoint, Service-Dominant logic, Service Logic, and value creation in service process are discussed.

The thesis is a case study, which utilizes design thinking, qualitative research methods, service design tools and user-centered development approach in developing a new digital service concept. The empirical part of the study follows the Double Diamond design process model (Design Council 2007). After introducing the empirical process, outcomes of the case study are presented. The thesis is closed with a discussion and reflection by the thesis writer.

This thesis touches upon business-sensitive information which is considered to be owned by the case company. By the request of the case company, some details are excluded from the thesis to protect the sensitive information. This is mentioned later in the thesis where applicable.

2 Product information has a central role in modern retail business

In the context of business data, the term *information* refers to a processed form of data. When pieces of data are processed so that they have a meaning to the reader, they become information. (Bocij, Greasley & Hickie 2019, 6-7.) Product information is a specific type of information, which concerns *products*. This chapter focuses on defining what is meant by product information management in retail, which is the context of the thesis.

As creating information involves the efforts and resources for processing of raw data, initially there is a need for a certain information. Hence, information is created for a specific purpose. (Bocij et al. 2019, 8.) Product information is managed by organizations both for internal business purposes and to be displayed to external audiences such as end customers in e-commerce platforms (Abraham 2014, 3).

Value is a generally acknowledged feature of information. Sometimes, but not in all cases, it is possible to even measure the value of certain information. One characteristic of information is that it can be used to reduce uncertainty and assist in decision-making. For instance, one could measure how much of an impact to a decision-making process the information has and reduce the cost of collecting the information. (Bocij et al. 2019. 8-9.) Thus, high quality product information is a valuable asset for companies. As e-commerce has provided both consumers and businesses the opportunity to learn about different products and to compare them and their prices across different platforms (Roehl-Anderson 2010, 183), detailed product information assists the customers in their decision making (Abraham 2014, 21).

Product information plays a key role in modern retail; not only physical products are being exchanged between the supplier and retailer and eventually the end-customer, but digital information about the products is a necessity (Abraham 2014, 8). While e-commerce is well associated with buying and selling, more e-commerce related business processes take place behind the scenes (Bocij et al. 2019, 45). For instance, product life-cycle information managed by a company allows new products which are not yet available, to already be pre-ordered (Abraham 2014, 57-58).

To conclude, product information is required for both organization's internal processes and to support consumers decision-making in modern commerce. In the next chapter, the key concepts and systems of product information management are discussed.

2.1 Product information management key concepts and systems

Product information can be managed by organizations by using specialized information systems such as *PIM*, *ERP* and *DAM*. This chapter introduces some central abbreviations and systems in product information management context, as well as standardized product information categories mastered by these different systems.

Product information has various formats and is managed by various systems

Master data is the backbone of all product information. The system used to manage Master data is typically an ERP - an abbreviation of *Enterprise Resource Planning system*. ERP handles information related to both selling the items but also to the processes of logistics and warehousing. ERP is in such a crucial commercial role that without product existing in ERP, it would become impossible for most companies to do business at all. (Abraham 2014, 7, 11, 13.)

Product lifecycle management (PLM) is another type of product information, which is used to manage the journey of a product from idea to implementation. In PLM systems organizations can manage information related to manufacturing such as records of components and quality management process. Another system used to manage the process of manufacturing products is PDM (Product Data Management) where product versions along the product development can be documented alongside with contracts, notes, drawings, and other important documents. (Abraham 2014, 13.)

Product information of a product can entail several different formats. Digital assets are visual materials such as images and brochures. A term related specifically to digital assets is Digital Asset Media (DAM). DAM systems can manage all digital media, not only those directly related to products. (Abraham 2014, 13.)

PIM systems

PIM is a rather recent term dating back to early 2000's. Some software vendors use PCM (Product Content Management) and PRM (Product Resource Management) as alternative terms for PIM (Abraham 2014, 1,12). The role of PIM system is to have high-quality product information centralized in one place (Abraham 2014, 3; Roehl-Anderson 2010, 182).

PIM data is collected from many sources thus a core feature of a PIM system is to transform data collected from multiple sources in various formats, into a unified format. This harmonized information stored in PIM can then be used in multiple platforms such as brochures or web pages. (Abraham 2014, 6-7.)

Typically, PIM is connected to ERP, which as mentioned is used to manage master data. The basic data is *enriched* in PIM with even more information. (Abraham 2014, 7,11). Enriching product information is a product information category which aims to inspire customers with good quality images and selling text. Enriching product information can include key facts about the products that are essential for the customer to know. (Abraham 2014, 26-27.)

Typically, PIM system also stores those assets which are directly related to products. Some other examples of enriching product information managed in PIM are describing attributes and product relations, where similar products or spare parts are linked to a product. (Abraham 2014, 5, 13). Hence, information stored in PIM is rich and useful for external customers.

To conclude, data can be gathered from other mastering sources to PIM. In addition to PIM, organizations can have several systems for product information management such as ERP and DAM. Product information is used to both enable business functions and easing customer's purchasing decision in different sales channels.

Complexity of PIM system context is reflected in related development projects

Product information stored in PIM can be produced both inside and outside of the organization managing the PIM. The users of PIM, too, can be both from inside and outside of the organization. While the internal user groups of a PIM system can be for instance procurement and marketing departments, the external users can be product suppliers adding information concerning their products, or end-customers giving their reviews. (Abraham 2014, 6.)

As mentioned, PIM data comes from various sources. This also makes the context of PIM intricate, which according to existing research, is reflected in PIM system projects. Roehl-Anderson (2010, 181) reasons that PIM data is complex due to the lack of consistency in data format and its use in different systems. According to Roehl-Anderson, the introduction of PIM system typically requires higher investments than anticipated, and the return of investment (ROI) tends to take a longer time than what was planned.

PIM system context complexity is also evidenced by Abraham (2014, 82), who states that the initial budget is often exceeded due to the complexity of PIM implementation process. Similarly, according to a case study by Battistello et al. (2021, 10), PIM-system projects typically have challenges which occur in the scoping and early implementation concerning quality of data, cognitive complexity, timing, and organizational complexity.

Summarizing the previous, existing research suggests that PIM system as the development task context is complex both from data quality perspective and organizational perspective. In this thesis, the complex nature of the context is taken into consideration when selecting a suitable design process for the development task in the empirical part of the study.

2.2 Information asymmetry in information sharing as a challenge and opportunity

Time to market can be reduced by using PIM system, as the product information can be collected and selling can start even before the physical product is manufactured. This can offer strategic benefit both the product supplier itself and the retailers and wholesalers. (Abraham 2014, 17.) Information can be transmitted between actors formally, such as using a standard template, or informally, such as written notes. Formal transition of information has advantages: the format is concise and typically created to fit a certain occasion. On the other hand, the disadvantage of formal transition lies in a strict format which typically does not support all types of data content and form. (Bocij et al. 2019. 10.) Manual work is required if data needs to be manipulated to suit a certain standard format if the original format can't be utilized as such.

Information asymmetry is used to describe the scenario in which product information is different between organizations. While various actors of a product supply chain take part in creating and editing product information, the data is handled by different organizations, people, and systems. Since the needs of organizations vary, the data is localized and only partly copied from the original source. (Mattila, Seppälä & Holmström 2016, 8-9.) This means, that the product information related to same product is not necessarily identical between organizations.

Information asymmetry also results in challenges in terms of how the product information updates can be shared between stakeholders. Sharing the product information updates between organizations can be based on manual work which as a process can be both costly and unreliable (Mattila et al. 2016, 9), as organizations edit the data according to their system requirements and business needs.

As a solution to information asymmetry a product-centric information management approach has been suggested. Product-centric information management refers to a framework where product information is harmonized and can be updated between stakeholders as it is. In

product-centric information management the information updates can be done using an interface (API) to transfer data between the systems while still storing the product information in organizations' own platforms. Another option would be storing the data in a centralized, shared database from where it would be distributed to stakeholders. (Mattila et al. 2016, 10.)

Despite the practical challenges in product information maintenance, different data-sharing relationships between stakeholders are also a source of competitive advantage, making the idea of a centralized data warehouse a less tempting option (Mattila et al. 2016, 15). In fact, companies even seek business benefits by *deliberately* customizing product information: search engine optimization (SEO) increases the positioning of the product in internet search results as specific keywords are planted into text to attract the search engines (Baltes 2016, 38). Hence, SEO is a way of utilizing information asymmetry to stimulate business.

Mattila et al (2016, 11) also point out that one shared platform for product information is the recommendation for product-centric data information management, but companies have seen more value potential in setting up their own systems instead of being locked into a data platform operated by another stakeholder. In other words, by creating their own solutions, companies can remain more independent.

As the role of product information in commerce has evolved during the recent years, the expectations towards PIM system capabilities have also increased. PIM systems' traditional role has been connected to master data management in which the main purpose of PIM has been a centralized storage for harmonized product information, as was explained in the previous chapter. Now, in addition to data storage, modern PIM systems need to provide additional features such as external portals to facilitate the product information sharing between stakeholders. (Jewell & Maddox 2021, 2.)

Another means to share product information between organizations are direct integrations which can reduce manual work. However, Mattila et al (2016, 10-11) claim, that storing product information in organizations' own systems and sharing it via APIs would not be an ideal solution on a bigger scale such as industry-level as it would result in highly complex API ecosystem. An additional challenge lies in the power-hierarchy managed by the platform owner as if some platforms become dominant, they can reduce the fluency of information sharing to some stakeholders as a part of their collaboration with another stakeholder. While some stakeholders could benefit from the scenario, it would not be good from product perspective.

Concluding the information presented in this chapter, there are practical challenges in sharing product information between stakeholders in supply chain as the needs of organizations vary and same information is not stored similarly by all stakeholders. The

resulting information asymmetry between organizations often results in manual processes. On the other hand, information asymmetry can also be a source of competitive advantage as stakeholders are competing over not only the most accurate but also rich product information to be presented to their end customers and recommended by search engines.

Followingly, despite the practical challenges around product information sharing between stakeholders, the individual relationships between product suppliers and retailers as well as unique versions of product information possessed by organizations entail a source of competitive advantage. The potential benefits of information asymmetry for a company itself can act as an incentive to develop local data-sharing structures.

Due to the importance of the externally displayed product information such as e-commerce, end-customers are an important stakeholder of PIM data. However, for this thesis and development project scope, the end-customer is left out of scope. The development program will be looking into the needs from end-customer viewpoint in later phases of implementation.

3 Service as a theoretical concept

It could be stated that a PIM supplier portal is a digital product which is used for product information management purposes. Challenging this view, this thesis explicitly aims to approach the development project from service thinking perspective. Thus, defining what is meant by service, and exploring how to apply the relevant service theories to the development task at hand, and is essential.

To approach the context of the development project from service thinking perspective, Service-Dominant logic (S-D logic) and Service Logic (SL) are discussed. Moreover, this chapter aims to increase the understanding on how a PIM supplier portal can create value to involved stakeholders, which is also the first guiding question of the thesis: How do we co-create most value with service partners through a digital portal?

In service literature word *service* as an economic phenomenon and *services* as economic activities have a different meaning. The well-known service theorists Vargo & Lusch (2014, 11-13) consider that *service* occurs when actors utilizing their competences for either their own or other actor's benefit. Followingly, according to Vargo & Lusch, goods such as products or tools are creations of competences possessed by individuals, and they are in fact only appliances for delivering service between actors. Service-Dominant Logic as a framework created by Vargo & Lusch is discussed in more detail in chapter 3.1.

There are many definitions available for the term *services*. One definition for services is done by Wirtz & Lovelock (2018, 12,14), who define services as economic activities which are used to generate value for their users without physical ownership. Some practical examples could be that by using a service, the service user can gain access to a physical space, such as a hotel room, or to a digital system.

One can also take the perspective of what is gotten out of using a service. Often the purpose of a service is to enable the user to utilize something for a certain time period. Users benefit from using the service because it allows them to access something that is too complicated or too expensive for them to have themselves, such as access to the unimaginably large data set offered by Google search. Services provide the service user with the experience of using a service as a part of their own journey towards a desired goal. (Polaine et al. 2013, 30.)

The value from services can be categorized into care, access, and response. Often services offer value with a combination of the three. Care and access can be provided to people or things, and response is received from either people or things. (Polaine et al. 2013, 28-30.)

By the previous definitions, it is easy to note, that service as an economic phenomenon and services as economic activities are not only found from service industries of a traditional sense, such as hairdressers and cleaning services. A PIM supplier portal as a service could give the service user access to a digital space, where they could perform certain tasks and manage large sets of information while gaining an access to enhanced processes. The service users could even get response from the digital portal instead of a person, such as a notification assisting them in using the service. On the other hand, reflecting on the definition presented by Lusch & Vargo, PIM supplier portal as service is a manifestation of skills which are used to benefit the service users by enhancing product information sharing related processes. Concluding the previous, PIM supplier portal is simultaneously *a service* and *service*.

In the efforts to design a digital service concept which will generate value both to service provider and service users, it is essential to better understand how service can create value. Service-Dominant Logic as a theoretical approach to economy and Service Logic as an approach to value creation in service are introduced next, followed by discussing service users' role in value creation process and familiarizing with self-service as a concept.

3.1 Service-dominant logic challenges the traditional view on business

Goods-dominant (G-D) logic refers to business theory where economic exchange is based on trading of physical items (Lusch & Vargo 2014, 4). This approach can be referred to as the traditional approach to economy, where focus is on tangible outputs and value as a feature which is embedded into products which can change ownership. Service-dominant (S-D) Logic was introduced by Robert Lusch & Stephen Vargo, as they questioned the traditional G-D view

on economy and the whole nature of the exchange that is occurring between individuals and organizations. (Lusch & Vargo 2014, 5.) Criticizing the G-D logic where economic exchange is based on value embedded in products, S-D Logic suggests that “all businesses are service businesses” (Lusch & Vargo 2014, 15).

S-D Logic suggests that humans acquire specialized skills and make trade-offs with other humans on their abilities, as they benefit from the specialized skills acquired by others. A network of trade-offs is created. In this complex system, bigger formal entities such as companies and industries but also more abstract creations, such as languages and societies, are formed to improve the exchange process between stakeholders. (Lusch & Vargo 2014, 4.)

Additionally, Lusch & Vargo (2014, 10) avoid further defining stakeholders by terms such as B2B or B2C, as they argue that by rephrasing the roles of customers, firms, consumers, and producers simply to *actors*, a less restricted and real view on the occurring service exchange is revealed.

Lusch and Vargo (2014, 80) suggest, that as actors are specializing more and more, they also become more dependent of the surrounding network of other actors and the service-to-service exchange process with them. Thus, to gain viability, actors need to work towards improving the efficiency of the exchange systems they are in.

The development task of this thesis can be viewed as the type of effort described by Lusch & Vargo. By increasing fluency in product information sharing between actors, the case company aims at enhancing the service exchange process in a network of multiple actors, aiming to create value for both the actor itself (service provider; the case company) and other actors in the service exchange network (service users; suppliers and internal stakeholders).

The four axioms of S-D Logic

“Service is the fundamental basis of exchange” is the first axiom (Lusch & Vargo 2014, 15). To be precise, S-D Logic defines the term *service* as “application of competences (knowledge and skills) for the benefit of another entity or the entity itself”. According to the theory, goods are creations of competences possessed by individuals, and they are only appliances used in delivering service between actors. (Lusch & Vargo 2014, 12-13.)

S-D logic suggests that the relationship between goods and services is that the role of goods is to be a tool in the process of delivering service. Where G-D logic sees a seller and buyer of goods, S-D logic sees actors serving one another (Lusch & Vargo 2014, 6,11). Summarizing the previous, products and tools are a means to deliver service, and the service is the underlying motivation to use the item.

The second axiom of S-D Logic is “the customer is always a cocreator of value”. According to S-D Logic, a company is not the only active subject providing value towards the customer, but instead the customer is viewed as active participant in co-creating the value in the process of service exchange. (Lusch & Vargo 2014, 15.) Hence, according to Lusch & Vargo (2014, 70), value creation is in fact *value co-creation* which emerges when resources are integrated and used.

S-D Logic often refers to resources, and according to S-D logic, there are two types of them. S-D Logic distinguishes resources into “operant and operand”. Operant resources are intangible resources such as skills, and operand resources usually consist of physical material (Lusch & Vargo 2014, 119). Physical products, for instance, are considered to be operand resources. This leads us to the third axiom in S-D Logic is “all social and economic actors are resource integrators”. According to Lusch & Vargo, actors cocreate value through integrating different resources such as personal skills with physical resources. (Lusch & Vargo 2014, 16.)

S-D Logic has a strong emphasis on subjective experience of value, and it suggests that companies as service providers can only make value propositions, which are interpreted by service users. The fourth axiom in S-D logic is “value is always uniquely and phenomenologically determined by the beneficiary”. Actors can only produce value propositions, which are interpreted by other actors in a unique way. (Lusch & Vargo 2014, 16.)

Summarizing the previous, the four axioms of S-D Logic emphasize the subjective experience of value and consider value creation to be an outcome of resource integration. Service is seen as the underlying structure of all economic activity. Lusch & Vargo offer a different perspective to business, diluting power hierarchies by viewing all stakeholders as actors who aim to enhance their own processes in a network of service exchange. This approach can be applied to PIM supplier portal as well by considering the case company and the suppliers as equal actors in a service exchange network.

3.2 Service Logic promotes value-in-use

The traditional view, previously referred to as G-D Logic, has considered value to be a feature of products which are manufactured by companies. According to this view, when a customer buys a product what happens is “value-in-exchange”. (Grönroos 2015, 13.) In the 90’s a new approach emerged where it was seen that customers don’t just buy goods or services but instead, they buy the value that is provided by them (Grönroos 2008, 301). The substantial shift from viewing value creation as a company-driven process embedded into products, to an experimental phenomenon experienced by individuals, was already noted by Prahalad & Ramaswamy (2004, 5), who described market becoming a forum for multi-stakeholder dialog and interaction in which value is located in *experiences*.

Value creation has been in interest of service thinking theorists. As previously mentioned, Lusch & Vargo (2014, 9) suggest that what happens in the exchange between actors is that they integrate resources, exchange services to services and eventually co-create value. Lusch & Vargo's S-D Logic views the concept of exchange as not only individual incidences between actors but more of network or system of actions, where single actions belong to a vast system of exchanges (Lusch & Vargo 2014, 7). Still, the definition of value creation remains on a high level.

On the other hand, Service Logic provides a more practical approach. Service Logic (SL) is a theoretical approach and view on business, where goods and services are seen as tools for providing service (Grönroos 2015, 48). Grönroos (2008, 305) claims that customers are not co-creators of value but the actual *creators* of value, because the value is created by them as "value-in-use". Value-in-use focuses on the value creation process in service user context and how service user creates value while using a product (Grönroos 2015, 13). Service logic (SL) also explicitly emphasizes the importance of value creation considering it to be the basis of economic activity; contradicting S-D logic which sees service as the basis of economic activity (Grönroos & Gummerus 2014, 211).

According to S-D Logic, actors can produce value propositions, which are interpreted by other actors (Lusch & Vargo 2014, 16). SL, on the other hand, considers value creation to be a customer-driven process where value is created in customer's own processes (Grönroos & Gummerus 2014, 206). Grönroos & Voima (2013, 144) suggest that value-in-use is a creation of the customer, and only when customer is experiencing value-in-use, value creation emerges. The view is supported by Polaine et al. (2013, 23) who state that services which are not used do not create value and vice versa; that services can create value only when they are used. Hence, service value emerges as a subjective experience related to using a service.

To summarize, according to SL the role of the service provider is to be the facilitator of value creation process, but the value is created as value-in-use by service user (Grönroos & Gummerus 2014, 216-217). Service users in the case of a PIM supplier portal can be both external and internal users: employees of the case company and supplier representatives. Previous discussion about value creation also suggests that value of a service is uniquely experienced by service user when service is used.

Elaborating on the concepts of S-D Logic and SL, it can be concluded that in the aim to create value-providing services, understanding the user context is crucial. The first guiding question of this thesis is asking how value can be co-created through using the portal, and this requires further exploring the needs of the actors in the service context in question, which will be done later in the empirical part of the thesis.

3.3 Service users as value creators

According to S-D Logic, the motivation for actors to engage with the service exchange process is to enhance the actor's own viability (Lusch & Vargo 2014, 92). Similarly, according to Service Logic (SL), the service user aims to enhance its own processes (Grönroos 2015, 13; Grönroos & Gummerus 2014, 208). Hence, service should create value for service user in order for them to engage in service process.

According to S-D logic, value is co-created through resource integration in a process of service exchange (Lusch & Vargo 2014, 132). Conversely, SL suggests that value is not *always* co-created, but that the service provider can actively contribute to customer's processes and become a value co-creator (Grönroos & Gummerus, J. 2014, 211; Grönroos 2008, 306).

According to SL, service provider is a value *facilitator* and service user is a value *creator* (Grönroos 2015, 15). Grönroos & Voima (2013, 141) suggest there are three spheres affecting value creation process:

- provider sphere, which holds potential value
- customer sphere includes taking potential value into use and turning it into value-in-use
- joint sphere, which is located in between the two. In the joint sphere the customer is leading the value creation process, while the provider can actively influence it through interaction with the customer

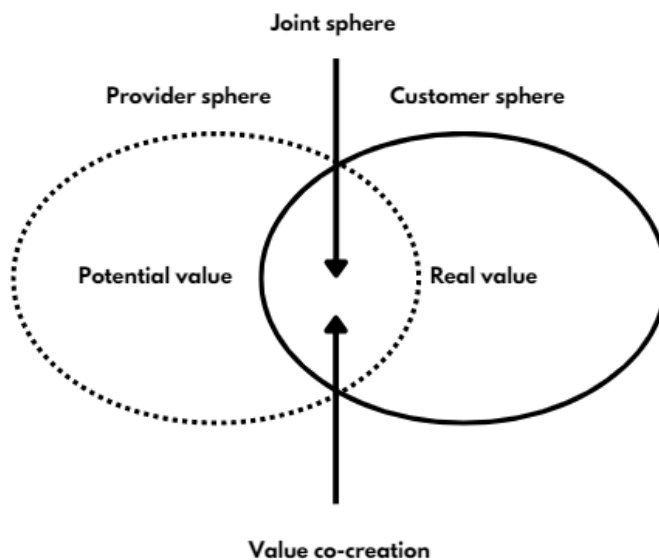


Figure 2: Provider sphere, customer sphere and joint sphere (modified from Grönroos & Voima 2013, 141)

In the joint sphere the two actors (provider and customer; service provider and service user) are engaged in direct process with each other, co-creating the service. The joint sphere is a so called “co-creation sphere” where service provider has influence on the otherwise independent value creation process of the service user. (Grönroos 2015, 15.)

In the joint sphere, only direct interaction between actors occurs (Grönroos & Gummerus 2014, 209). Direct interaction means that actors enter a dialogue where they influence each other’s actions and through this direct interaction the actors can influence to the value-in-use experienced by one another (Grönroos & Gummerus 2014, 217). Co-creation of value happens through these direct interactions (Grönroos & Voima 2013, 146).

From the point of view of this thesis, it is worth acknowledging that direct interaction can emerge between people or between people and intelligent systems (Grönroos & Gummerus 2014, 213). If we consider PIM supplier portal to be an intelligent system, it offers us a view on service value creation which can occur in direct interaction between people *through* the portal or interaction between people *and* the PIM supplier portal.

Grönroos & Gummerus (2014, 217) suggest that direct interaction between an intelligent system and a person forms a value co-creation platform, where both can react to input done by the other. Elaborating on the concept of value co-creation platform, it seems that in order for service user to have direct interaction with a system, the system needs to provide response, for which the service user can respond in return. Thus, for PIM supplier portal to be a part of a value co-creation platform, it needs to be responsive to service user’s actions.

According to Grönroos & Voima (2013, 147), companies can make more than value propositions when they actively participate to customer’s value-creation process through interactive procedures. If the service provider is capable to understand the role of joint sphere’s interactions in service user’s context, the role of service provider is evolved from a facilitator of value into a value co-creator (Grönroos & Voima 2013, 141). In the joint sphere the roles can change, so that the customer is acting as the service provider and co-create value together with the service provider. (Grönroos & Gummerus 2014, 210.) The bigger the joint sphere is, the more potential it has for value co-creation (Grönroos & Voima 2013, 142). When service user (“customer”) is actively participating into the development processes of service provider, the joint sphere becomes bigger thus contributing to value co-creation (Grönroos & Voima 2013, 141).

In product information exchange process between suppliers and case company, it can be recognized that both are providing service to each other as the product information is shared and enhanced producing mutual business benefit, which indicates that the service is occurring in the joint sphere. Thus, a PIM supplier portal can be viewed as a co-creation platform as described in SL, where the value created in the platform is mutually experienced. From this

viewpoint both actors are active in value creation. The potential value is not just proposed by the service provider, but actual value can be co-created. This also makes sense in the context of PIM supplier portal, as the aim is to enhance both service providers own and suppliers' processes in product information sharing.

Reflecting on the previous, if service users are participating in the service development process of service provider, there is more potential for the service provider to influence on the value creation of the service user. In the case of PIM supplier portal, the service users are both internal and external stakeholders working with product information. Hence, in order to create a PIM supplier portal which brings value to users, having the users participate in the development process increases the chances for success.

3.4 Self-service allows a more efficient service delivery

A PIM supplier portal is a self-service in which suppliers can contribute to product information managed by the case company concerning products which they supply. In this chapter, we will discuss self-service as a concept in the aim to understand how self-service can create value.

In a service exchange process the actors form a system which is both limited and enabled by the resources and the social context the service is occurring in (Edvarsson, Tronvoll & Gruber 2011, 14). Edvarsson et al. (2011, 4) state, that the social context of where the service exchange occurs affects the value co-creation, and that the service experience can be different across individuals and even in different occasions. The way how a service user perceives value and how they integrate resources is determined by their unique context, such as their skills to use available technology (Edvarsson et al 2011, 6; Scherer, Wangenheim & Wunderlich 2015, 7).

Technology offers potential to improve process efficiency in organizations, as tasks are handed over from service provider to external service users, such as customers. (Castro et al. 2010, 5.) Self-service portals can offer other benefits, too. For instance, email communication has a limited capacity to file sharing due to file sizes, whereas different portals can handle larger datasets to be shared. Moreover, in addition to data sharing, modern portals offer a variety of features such as notifications and integrations. (Girsch-Bock 2015, 6.)

Self-service in the digital context in general has been generated by IT development. Modern technology has allowed user interfaces to become user friendly, thus enabling the applications to be used by people without further expertise on the context. (Castro et al. 2010, 7.) The Internet itself is an example of a self-service, as it allows people to search for information, take actions in websites and produce new content independently (Castro et al. 2010, 18).

Self-service as a concept is mutually beneficial to both service provider and service user. In self-service, the service user takes upon a task otherwise done by the service provider. However, for service users to find the task desirable to take upon on, benefits need to be provided alongside. Self-service can provide various benefits, such as easiness and faster service delivery, allowing the service user to choose when to use the service, and to experience being in control over their task. Accessibility is an additional benefit of self-service; for instance, the user interface can have several language options. (Castro et al. 2010, 4-5.)

While an easier and faster service delivery can be an outcome of a self-service, it does not equal *automation*. Automation reduces the work needed, whereas in self-service the task is simply delegated to service user. (Castro et al. 2010, 4.) But despite moving task over to the service user, self-service does not only benefit the service provider by reducing their workload. On the contrary, self-service aims to improve the efficiency and easiness of service delivery for the service user themselves. (Castro et al. 2010, 31.)

Self-service applications allow the service user to enhance the service delivery independently (Castro et al. 2010, 5). However, the tasks offered to complete using a self-service should be simple enough for the user to manage them independently, as an unclear and difficult task will result in the user reaching out to service provider employees (Scherer et al. 2015, 12). Scherer et al. (2015, 13-14) suggest that self-service is likely to provide the user with the most value if the operations done in the self-service consists of simple tasks which are done repeatedly. They state that even more complex tasks can be managed through self-service, and that it can still provide value to user if the user just *feels* that their skills will suffice for the challenge at hand.

To conclude, co-creation of service value in self-service is affected by the user's resources such as skills and motivation, and the characteristics of the tasks offered through self-service (Scherer et al. 2015, 15). It is worth acknowledging, that as was stated, users are more likely to take on even complex tasks in self-service, if they feel confident that they can accomplish it. This implies that a self-service, such as a PIM supplier portal, should be experienced as easy to use for the users to receive value by managing tasks in it.

Concluding the discussed theories

The modern, service centric business logic emphasizes that all business is service business (Ojasalo, Moilanen & Ritalahti 2015, 72). All companies should see themselves as service companies if they want to succeed in assisting their customers create value using the services or goods provided by them (Grönroos 2008, 307).

Both SD-logic and SL suggest that products as well as any other resources can be used as services (Grönroos & Gummerus 2014, 211), thus service thinking can be applied to designing a PIM supplier portal. Followingly, the previously introduced service theories suggest viewing the development task as a service, where both internal and external service users aim to enhance their product information management related processes.

Based on SL, it was stated that a service located in the joint sphere of actors enables potential value co-creation. In addition, in the co-creation sphere both actors can act as service provider and service user, as is the case in a PIM supplier portal where information can be shared and enhanced by both stakeholders for mutual benefit. Moreover, if service users take part in developing the service, the joint sphere can become bigger, thus user participation to development work can contribute to value co-creation.

Following the S-D Logic and SL, it seems that in the context of the development project the value of PIM supplier portal will be experimental and uniquely defined by the portal users. The uniqueness of the context in value creation implies, that copying an existing service as such from another actor will not be creating identical value when it is placed into case company context. This set the thesis writer with the requirement to understand the needs of users in the specific context of the case company and its suppliers, in order to design a novel service which responds to their needs. Thus, in order to design a service based on the contextual needs, external benchmarking and competitive analysis is left out of the thesis scope.

It was also stated that a self-service portal can provide value when user has sufficient personal resources to use it and *feel* that they can manage the provided tasks independently. This highlights the importance of subjective experience in using the service for service value creation to occur.

4 User-centric approach in service development

The case company's business hypothesis for a PIM supplier portal was that the portal can benefit both internal and external users by enhancing the processes related to product information sharing. Based on the service thinking theories discussed in the previous chapter, it was acknowledged that a PIM supplier portal as a concept can be considered to be service, in which actors engage in service exchange process to enhance their own internal processes. Additionally, PIM supplier portal is also a service, which can be used by both internal and external service users.

In this chapter, we will study how user-centric approach can be applied to service development in practice. In the following chapters the concepts of co-creation, design thinking, service design and user-centered design are discussed.

4.1 Co-creation contributes to service desirability

In the previous chapter it was stated that stakeholders who engage in service exchange process can be referred to as “actors”. As actors collaborate, they learn and can optimize their processes (Lusch & Vargo 2014, 150, 154). Hence, collaboration in service exchange process contributes to system viability. One practical manifestation of collaboration is *co-creation*, where actors engage in a joint creation process.

Co-creation can be used as an umbrella term to describe different types of co-creational activities, such as co-ideation, co-design, and co-testing (Oertzen, Odekerken-Schröder, Brax & Mager 2018, 667). In other words, in the context of designing new or improving existing services, co-creation refers to involving users in the design process. The process of creating services together with users can be described with other terms as well, such as participatory design (Thomas 2020, 229), but in this thesis involving users to the design process is referred to as co-creation.

Co-creating services together with service users aims to enhance the service process and design desirable services (Oertzen et al. 2018, 642). According to Grönroos & Voima (2013, 146), if service users are not engaged in the service development process, service provider can only create value potential which might have real value for service users. Instead, by utilizing co-creation, design decisions can be based on better understanding of what the users need and find important (Thomas 2020, 227). Thus, involving users to service creation helps to identify what a valuable service could be like. Co-creation of services can take place in different phases of service development from initial ideation to service consumption (Oertzen et al. 2018, 667; Thomas 2020, 229).

For service co-creation to occur, there needs to be involvement, participation, and engagement towards the project at hand, which indicates that actors need to be motivated towards co-creating together. For external service users to engage in co-creation, they can be motivated by enhanced collaboration with the service provider and the opportunity to influence the future service, while organization’s own employees can be motivated by improving the ways of working in the future and business benefits such as faster time to market (Oertzen et al. 2018, 669-670).

4.2 Design thinking aims to identify the right problem to be solved

Investing time and effort in initial problem definition is sometimes overlooked in organizations. In fact, it is common for organizations to focus more on solving problems rather than first carefully defining them (Luchs 2015, xxiii). This seems to at least to some extent apply to PIM system development context as well, as Battistello et al. (2021,9) observed in their case study that scoping phase of a PIM system project is usually conducted briefly which also was one of the key challenges of PIM system project scoping and early implementation. This thesis focuses on a PIM supplier portal, which does not equal a full PIM system implementation project but does occur in the same system and organizational context.

Design thinking aims to identify the real problem before solving it, hence the approach pays particular attention to problem definition. Design thinking includes two stages: identifying the design challenge and working on the challenge. (Luchs 2015, xxiii.) As designers aim to first understand the problems behind problems and define the design challenge beyond to what is obvious, relevant needs behind the initial brief are allowed to surface, guiding the design forward to right direction from very early on (Chen & Liu. 2015, 2). In other terms, the design efforts can be targeted towards solving the right problem from service user perspective, which might not have been visible before spending some time in carefully defining the problem first.

In practice, design thinking means both a mindset and a process (Luchs 2015, xxix). The roots of design thinking reach beyond decades, but in 2000's the term has been widely adopted (Curedale 2016, 19). Literature of design thinking is well available from appreciated authors such as Tim Brown, and organization IDEO has been a pioneer in the field. The four key characteristics of design thinking are introduced next as described by Luchs.

First key characteristic of the design thinking mindset is, that it is people-centric, instead of system-centric. Design thinking prioritizes subjective experiences and needs of people while considering technology as a tool to fulfil the needs. Hence, the design thinking mindset requires a shift from technology-centric thinking towards a human-centric thinking. (Luchs 2015, xxix.) Applying the mindset to PIM supplier portal means that one should focus on what the users are aiming to achieve by using the software.

Second characteristic of design thinking is the cross-disciplinary ideal. Design thinking is open to ideas from outside the core team and welcomes outsiders to occasionally participate and give their input to the project. (Luchs 2015, xxix.)

Thirdly, design thinking is interested about the big picture and connections between things. The approach requires ability to tolerate uncertainty and remain flexible throughout the

design process but is also well-suited for solving ambiguous problems. (Luchs 2015, xxix.) In a case study by Battistello et al. (2021, 10) one crucial element behind a successful PIM project was found from the mutual adaptation done between the business need and technological capabilities. Design thinking aims to build the bridge between business, technology, people, and the context (Curedale 2016, 19), and it is applicable for complex and abstract challenges (Curedale 2016, 19, Luchs 2015, xxii). It seems that design thinking could bring benefits to the development project in the complex context of PIM systems, where bridges need to be built in between people and systems in a specific context.

The fourth characteristic of design thinking is that various means can be utilized to deliver a message to different audiences. Designers can sketch even very rough prototypes in the aim to gather feedback and engage the audience to a dialogue. Self-doubt and fear of failure are discouraged, as testing and learning from feedback are the drivers of design progress and iteration. (Luchs 2015, xxix.)

Design thinking as a mindset and method approaches problem solving in a non-linear, iterative manner. It emphasizes feedback as the driver for development (Luchs 2015, xxi). The first ideas and prototypes are likely to need more refining, and the mindset during the design process should be that a good design will simply not be reached without rounds of iteration. However, as each project is unique, it is not realistic to evaluate the number of needed iterations in the project planning phase. Even the tools to be used during the design process can be hard to determine when starting the project, which might seem strange for those unfamiliar with the design thinking approach. However, having flexibility and preparing for iterations in the design process while tolerating the uncertainty, wasted time can be reduced later in the project. (Luchs 2015, xxviii.)

To summarize the previous, design thinking provides a service user centric approach to development, focusing on problem-definition and iteration. Eventually, after concept evaluation, the work moves forward to the actual development work, which happens outside the design thinking framework, and is in ideal, more likely to produce excellent results stemming from the design process. (Luchs 2015, xxviii.) From the point of view of this thesis, design thinking as mindset prioritizes people over systems, and emphasizes collaboration and iteration as a part of design process. It is suitable for solving design challenges which are not initially very clear; and as mentioned, PIM system development as a context is complex. In design thinking mindset, iteration is seen as a natural part of development process where feedback guides the design forward. In practice, the previously mentioned co-creation is needed to enable the dialogue between designers and users.

4.3 Service design utilizes empathy

Service design is an approach, in which design-oriented methods are applied in a development process (Ojasalo et al. 2015, 38). Service design can be seen as a practical manifestation of the previously introduced design thinking, as both emphasize problem definition, iteration, and service user centricity. Service design is applicable for both enhancing existing and innovating new services (Stickdorn, Hormess, Lawrence & Schneider 2018, 22; Ojasalo et al. 2015, 73). The approach and methods are also often applied in digital service development (Ojasalo et al. 2015, 73), which is also the case in this case study.

Previously in this thesis it was stated, that according to Service Logic, understanding service user's context is important for service value creation. Service design approach brings a co-creative and user-centric essence to project implementation (Ojasalo et al. 2015, 38). It is based on deep understanding of the context and user needs, and empathy has a key role in applying service design (Ojasalo et al. 2015, 72).

The nature of service design is co-creative and experimental. Early feedback and, similarly to the previously introduced design thinking, iteration, are applied (Stickdorn et al. 2018, 20). Characteristic of co-creation were also discussed in chapter 4.1, where it was concluded that co-creational activities contribute to desirable services. Hence, service design approach is applicable for designing services that meet user needs. The goal of applying service design is to further combine the needs of service users with the needs of the business with available technological solutions (Stickdorn et al. 2018, 20).

In practice, service design aims to create services that meet the user needs on a concept level. Followingly, the aim of service design is to design desirable service concepts, which are usable and desirable for the service user, and affordable and effective for the service provider (Ojasalo et al. 2015, 71-72).

Service design explicitly considers service users to be in key role in service development. Both external service users are considered to be co-designers, as well as all the internal staff members who work with providing the service. Staff's participation in the design process is seen to be important for the success of the service also because their participation creates engagement. (Polaine et al. 2013, 43-44.)

From change management the perspective of building trust is an essential part in service development, as if the future users don't trust the service provider, they are likely to be more hesitant to shift using the new service (Witz & Lovelock 2018, 258). Service design builds on working together, and co-creation contributes to commitment to the project at hand (Stickdorn & Schneider 2012, 196), which can be identified as an asset of utilizing service design.

In chapter 4.1. it was pointed out, that co-creation can occur in different phases of design process such as ideating or testing. Service design aims to engage users throughout the design process; in initial stages of the design process, the focus is on gaining empathy with the users, as understanding their context is seen as important part of the design process. (Wetter-Edman & Magnusson 2015, 297l.) Still, for viable solutions, interdisciplinary co-operation between both internal and external stakeholders is needed throughout the service design project (Stickdorn & Schneider 2012, 123). Thus, service design has a strong emphasis on involving service users to design process all the way from identifying the right problem to further developing the service concept.

Despite the user-centric orientation, usability or UI design are not the primary focus of service design, as its interest is in designing the overall concept from both provider and user perspectives (Stickdorn et al. 2018, 23). In the next chapter, user-centered design is discussed. User-centered design offers a human-centric approach to system development on development specification level.

4.4 User-centered design as an approach to system development

When a new service is developed, many professional roles are involved, such as business managers and developers to name just a couple. It is typical and reasoned that from each professional role the viewpoint on the goals of design is slightly different. Developers are more focused on reaching technological goals whereas business managers are aiming to reach budget goals. Despite the different goals and viewpoints, the eventual goal is to create a design which is used by people. (Stull 2018, 5.)

Understanding the users has become more important part of modern design process. Design thinking puts a high priority to user experience, encouraging even developers to pay attention to it. (Gruen 2015, 2100q.) In system development context, development approach focusing on users is called *user-centered design*. User-centered design means designing according to the user needs (Lowdermilk 2013, 5-6), which has similarly to design thinking and service design, a strong emphasis on user viewpoint.

Whereas service design aims to create *service concepts* that meet the user needs (Stickdorn et al. 2018, 23), user-centered design aims to design that kind of *features and functions* that are valuable for the user (Lowdermilk 2013, 7). It can be argued, that while design thinking focuses on solving the right problems, service design aims to design desirable and usable concepts, and user-centered design focuses on the right kind of features to be implemented.

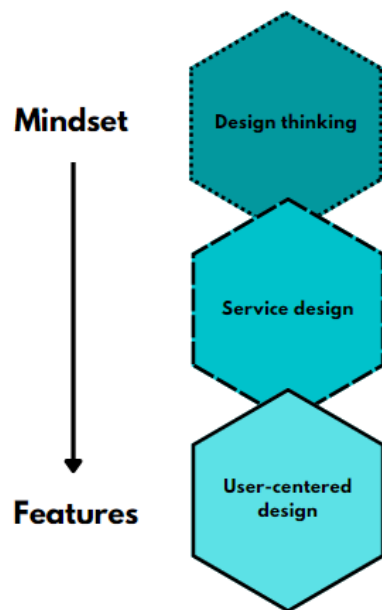


Figure 3: User-centric approach of this thesis: from mindset to features

User-centered design in development work supports implementing an excellent user experience, as the focus in design is on the user and the answering to their needs. Having a good usability is also in the very core of why to apply user-centered design. However, user-centered design does not equal usability, despite it being of high importance as already mentioned. Usability refers to how people use products, which are either physical or digital. User-centered design is an approach which aims to respond to the *needs* of users. (Lowdermilk 2013, 5-6.) In other words, usability is about *how* people add items to shopping chart in an online store, and user-centered design aims to identify *what* people try to achieve when entering the online store.

It should be acknowledged, that whoever is involved in design process, is no longer the user. It is impossible to have the experience as a user from something you have created. (Stull 2018, 10.) While user-centered design aims to identify the user needs, it also aims to avoid assumption-based work. By involving users into the development process the development work can be based on real user needs and behavior instead of assumptions of the previous. Hence, user-centered design builds on real user feedback and insights instead of assumptions on what users want. (Lowdermilk 2013, 7.) Thus, the ideal of co-creation with users is common for design thinking, service design and user-centered design.

User-centered design emphasizes the importance of proper research of the user needs so that the eventual design will serve them, instead of bending the user needs to suit the implementation (Lowdermilk 2013, 12). Similarly, the iteration in service design is

continuous, and it does not end when a product is launched (Stickdorn et al. 2018, 20). Applying user-centered design in development and gathering user feedback should not be seen as waste of time, as on the opposite it can save time and costly findings later in the process. By utilizing a user-centered approach, money can be saved from needing to guide the users through complex workflows and bugs found in the production. (Lowdermilk 2013, 9-10).

4.5 Minimum Viable Service is not perfect

Digital services can be improved based on user feedback; thus, they don't need to be perfect at first. To allow new service to hit the market with a right timing, a light version (Minimum Viable Product) is released first, of which user feedback is then gathered (Baltes 2016, 35). Minimum Viable Product has different meaning depending on how the specific organization uses the term, but in general it refers to the lightest possible version which allows the desired service to take place (Patton 2014, 33). It is the typical approach for a Lean development, where the focus is on speed and avoiding building any time-consuming features (Stull 2018, 212).

In general, understanding what the service user aims to achieve is essential to avoid a poor and inconsistent solution (Christensen, Clayton, Hall, Dillon & Duncan 2016). Likewise, in defining a Minimum Viable Product, the focus should be in what the user should be able to do (Patton 2014, 28). A comprehensive understanding of the task the user aims to accomplish sheds light to what could be deprioritized (Christensen et al. 2016). Understanding user's goal was also pointed out as a key feature of user-centered design (chapter 4.4.) and design thinking (chapter 4.2).

As previously stated, the thesis approaches the development task from service thinking perspective, thus considers PIM supplier portal to be a service. For this reason, MVP is replaced with a term MVS, a Minimum Viable Service. Hence, an objective of the thesis was to identify the MVS requirements for the PIM supplier portal.

As not everything will be included in MVS, the minimum requirements should be based on the minimum from service user's perspective (Patton 2014, 33). There needs to be more perceived benefits from the new service compared to the old, otherwise the users will be preferring the old solution (Wittr & Lovelock 2018, 256). To learn what the minimum of a service truly is for users, the first versions can be viewed as experiments where assumptions of the minimum can be tested with users (Patton 2014, 35).

5 The research approach and methods used in the case study

A research approach can be quantitative or qualitative, and there are different use cases for each. Whereas quantitative methods are good in revealing or validating facts, qualitative research can better reveal the design potential. Listening to individuals can reveal new, innovative ideas, which cannot be collected using quantitative research methods. (Polaine et al 2013, 39.)

Since there was a need to understand the experiences from current product information sharing processes in order to identify how they should be enhanced, qualitative research approach was seen suitable for this development task. Reason et al. (2016, 9) state, that qualitative research approach contributes to understanding people's context and their motivations when the aim is to create a concept that should be adopted into use by people. Understanding the context of a service user is crucial: a service should always be designed to meet the user context because the user will not be likely to choose a service which does not comply with their context (Stull 2018, 22).

Case study focuses on a specific case

Case study, as the name suggests, should focus exploring a certain case (Ojasalo et al. 2015, 53). This thesis is a case study commissioned by the case company. The study explores digital service development in product information management context of the case company and its suppliers. In this section of the thesis, the development approach is introduced in more detail.

According to Ojasalo et al. (2015, 51) development approach should be selected prior to further defining the development process, but that the development approach does not essentially restrict the methods which can be selected. Case study has a research-oriented approach, and typically a variety of different methods are used for information gathering to generate a thorough understanding of the development challenge. (Ojasalo et al. 2015, 37.) The methods selected to this case study are presented later in this chapter.

Case study as an approach focuses on gathering research-based information in a certain context. It is aiming to produce ideas on how to solve a challenge in the context in focus. (Ojasalo et al. 2015, 37.) As described earlier in the thesis, the aim was firstly to study how product information sharing practices between the case company and its suppliers could be enhanced, and secondly to design a concept for a PIM supplier portal, identifying the MVS requirements.

A case study aims to produce ideas for development work (Ojasalo et al. 2015, 52), which was also the objective of the thesis. The scope of the thesis did not include the practical system development work.

In a case study, deep understanding is gathered about how and why something is happening. Followingly, the gathered information is used in the development process. It is typical for a case study, that as the knowledge about the case at hand is gathered, the understanding of the challenge at hand becomes more defined (Ojasalo et al. 2015, 53-54).

In this development project there are features from other research approaches besides case study, which is according to Ojasalo et al. (2015, 51) typical. In addition to case study, especially features of constructive research, which aims to produce novel and practical, information-creating constructions to existing challenges (Ojasalo et al. 2015, 65), and action research which perceives people as active agents of change and aims to produce change in a collaborative manner (Ojasalo et al. 2015, 58) can be identified in the project.

Summarizing the previous, the thesis is a research-oriented development project in a certain context - a case study. The thesis follows the typical process of a case study:

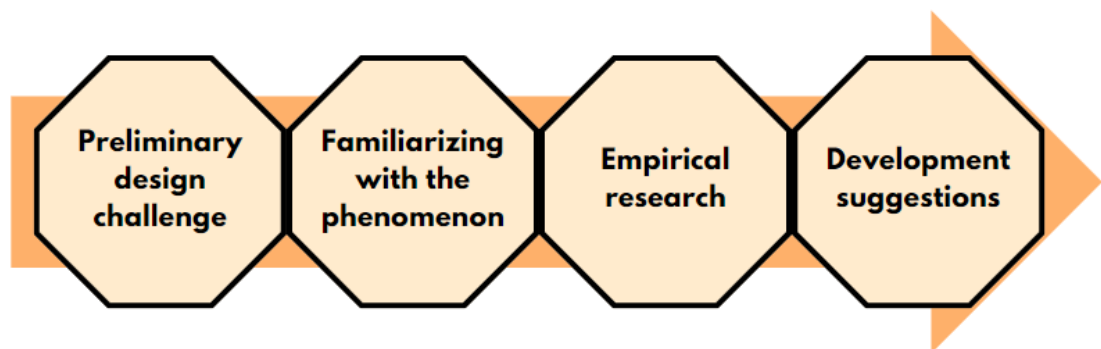


Figure 4: Typical case study process (Modified from Ojasalo et al. 2015, 54)

In the next chapter, the empirical part of this case study is presented.

5.1 Double Diamond design process

For this thesis, Double Diamond approach by the Design Council was chosen as the design process. Double diamond design process was developed by Design Council in 2005. It visualizes a design process as two diamond-shaped phases which both begin by divergence (ideating and gathering data), and end by convergence (analyzing and summarizing the data). There are four parts in a double diamond process, two parts in each diamond. The names of the phases in chronological order are discover, define, develop, and deliver. (Design Council 2007.)

The four phases of the Double Diamond

In the Double Diamond's first phase the aim is to understand the problem by having dialog with relevant stakeholders. This phase is called the "Discover" phase. (Design Council 2019.) As was mentioned in chapter 2.1., previous research suggests PIM system context to be complex due to organizational and data-related aspects. Identifying the problem properly before proceeding to implementation was required in this case study, since deeper understanding of user needs as well as the context needed to be established.

In the second phase of the Double Diamond process, the aim is to crystallize the problem based on the understanding which was gathered in the previous phase. Sometimes, the initial problem is rephrased in this phase. Thus, the second phase is called "Define". (Design Council 2019.)

In the third phase of the Double Diamond process, potential answers to the problem are ideated. This part of the design process is called "Develop". (Design Council 2019.) In the last part of the process, the potential solutions ideated in the previous phase are tested. This phase includes iteration until the right solutions are eventually identified. This phase is called "Deliver". (Design Council 2019.) In this thesis, the last phase of the Double Diamond is mostly left out of scope as the service is not implemented, however the process of how to proceed towards the implementation was established.

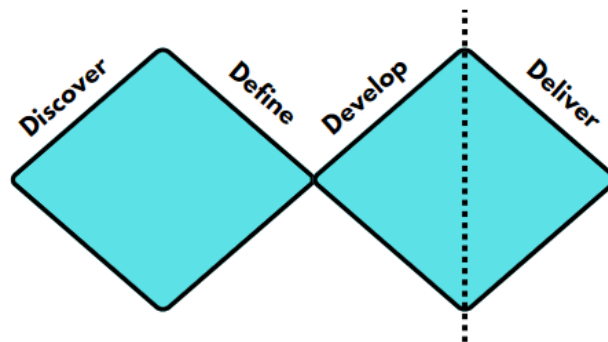


Figure 5: Double Diamond process of the thesis, modified from Design council (2007)

In this thesis, different methods were utilized during the empirical process which followed the Double Diamond design process.

Double Diamond process phase	Method	Purpose	Outcome
Discover	Semi-structured interviews	Empathize with users and their context	Development challenge was refined
Discover	Learning story	Understand what worked and what did not work in previous implementation from user perspective	Learnings from previous implementation were documented
Define	Focus group	Validate identified user needs with a new user group	Similar and different user needs were identified between user groups
Define	Personas	Crystallize the user needs	Three personas representing different user needs
Define	Service proposition	Gather early user feedback	Service proposition was validated and refined based on feedback
Define	Service Concept	Answer to identified user needs on a concept level	Service concept illustrates different aspects of the service
Develop	Service Blueprint	Visualize the service process as Minimum Viable Service	Structure of Minimum Viable Service
Develop	User stories	Establish the process for delivering the design to developers	User stories were written for first part of the Minimum Viable Service

Table 1: Different methods used in the Double Diamond design process

5.2 Methods applied in the empirical design process

In this chapter, the methods used in the empirical process are introduced in more detail.

Semi-structured interviews

Interviews are a typical method used in gathering information for a case study, as the approach is interested in understanding people in a certain context (Ojasalo et al. 2015, 55). Interviews are an efficient means to learn about user needs and pains, and when conducted early in design process, they provide a human-centric and reality-based foundation the project at hand (Thomas 2020, 77). Interviewing can be used when the aim is to understand the strengths and weaknesses in processes, validating hypotheses and in general, or to come up with a better understanding of a topic at hand. (Wilson 2013, 30-31; Portigal 2013, 11.) Portigal (2013, 5) considers that the power of interviewing reaches beyond pain point identification: user interviews act as *problem reframers*.

Interview as a method is useful in any phase of design process to continue increasing the understanding of user needs as the work progresses (Thomas 2020, 77; Portigal 2013, 6). There are different types of interviews, and in this case study a *semi-structured* interview was used as a method to collect information. Semi-structured interview is a useful method when something is known about the topic at hand, but more facts or point of views are needed. Semi-structured interviews can also be used for validating a set of findings as a means to explore if there are additional aspects that are not yet covered (Wilson 2013, 24-25).

Semi-structured interviews typically follow a pre-defined scope, and the interviewer is prepared with a set of questions. The interview questions together with opening words, possible probes and closing words for the session form an *interview guide*. During the interview, the interviewer follows the interview guide, but in a semi-structured interview it is also possible to include topics from outside the interview guide. (Wilson 2013, 24.) A semi-structured interview also allows changing the order of presented questions and how long time will be spent with each of them (Wilson 2013, 39).

Semi-structured interviews can reveal new aspects to known topics, as it allows new topics to be raised outside the pre-defined scope. The pre-defined scope of questions still helps the interviewer keep the focus and return to the interview guide if the discussion is distracted too far. By following the interview guide the same questions will also be asked from all interviewees. (Wilson 2013, 26).

The questions in the interview guide should be directly connected to the research at hand, thus help the interviewer collect useful information. The questions should be simple and neutral. (Wilson 2013, 31-33.)

Focus group

A focus group is a facilitated event, where the facilitator introduces topics to be discussed by the focus group participants. The facilitator guides the conversation encouraging the participants to share their views, but without taking a stand in the subject. (Valtonen 2005, 223-224.)

Focus group is a suitable method for ideating as well as studying experiences and opinions of participants (Valtonen 2005, 226). It is useful for many instances, such as when the aim is to understand requirements and define the problem which should be solved (Wilson 2013, 86). Focus group as a method allows the participants to bring up the aspects of the topic that they find most important. It is an effective means to gather large amount of information in a short period of time, the typical duration of a focus group being between 60-90 minutes. (Hennink & Leavy 2014, 1-2.)

Focus group as an information-gathering method differs from individually conducted interviews since the participants of the focus group hear each other's opinions which also might affect their own views. Due to the interactive group setting and elaborating on other's input, the data collected during a focus group interview will be different from data gathered in an individual interview. As an outcome of a focus group, a shared narrative of the discussed topic is formulated. (Hennink & Leavy 2014, 3.) The interaction might also reveal new questions or even insights which would not arise in individual interview (Wilson 2013, 86). Hennink & Leavy (2014, 2) point out, that the purpose of focus group is not to find consensus, but rather explore different views presented by the participants.

Usually, the focus group facilitator has a pre-defined set of questions or discussion topics to cover during the session. These questions can be based on previous research. (Wilson 2013, 89). In the beginning of the session, the facilitator communicates the ways of working and the purpose of the session to participants (Valtonen 2005, 232). During the session, the facilitator can respond to comments with additional questions and communicate non-verbally and verbally that they have understood what the participants have expressed. (Valtonen 2005, 235.)

The participants create their own unique setting for the focus group. Aspects such as whether they know each other from before, or take part on a voluntary basis or not, affect the interaction. (Valtonen 2005, 229.) Facilitating focus groups requires skills, as the group dynamics can be challenging, or participants may talk over each other which makes it hard to take notes (Wilson 2013, 88).

Learning story

User expectations arise from their previous experiences and knowledge. Understanding not only users' wishes for the future but their past experiences and views is useful when designing a service that should meet their expectations. (Reason et al. 2016, 19.) The benefit of documenting previous learnings in the form of a learning story is that it provides the understanding to what made a certain practice successful and what did not (Thier 2018, 29).

According to Thier (2018, 23) it is common for organizations not to prioritize reflection and to acknowledge its importance in the efforts to enhance processes and to avoid making the same mistakes again, one of the reasons being the lack of time. Nevertheless, by storytelling method, it is possible to gain understanding of the informal organizational mechanisms which affect adopting change. In addition, the learnings which are collected into a story form are relatable to the life of the readers, which make them easy to transfer into future scenarios. (Thier 2018, 22.)

Documenting the experiences related to strategically important project will also help in taking the successful strategies in use in other projects. This type of wider, experience-rich documentation should include not only the facts, but also human aspect of how the process was experienced. (Thier 2018, 28.)

A learning story process comprises different stages. Firstly, the purpose of the story is defined. What exactly should be documented and for whom? Secondly, interviews are conducted. Thirdly, data is analyzed and thus repeating, conflicting and meaningful patterns and statements are collected to form the main structure of the learning story. In fourth phase, the story draft is written. In the fifth phase the draft is reviewed by and eventually approved by the interviewees. After presenting the story to manager level, it is distributed to other members in the organization. (Thier 2018, 19-20).

A learning story is a synthetization of experiences gathered from several staff members. The important learnings and hints are saved in a story format, which is both informative and interesting to read. Once finished, a learning story can be shared with the whole organization to spread the learnings which can later be applied in other projects as well. (Thier 2018, 3.)

User personas

Personas are an effective means to communicate abstract research findings in a relatable way. They can be used to convey what was revealed in the research to other stakeholders, and act as stimuli for new ideas. (Calabretta & Gemser 2015, 4c-4d.) Personas do not illustrate any actual individual person, instead they represent different interest groups, and they are a combination of multiple research sources (Stickdorn & Schneider 2012, 173).

The additional benefit of using personas as a method is that it allows having the viewpoints of service users close to the development process (Ojasalo et al. 2015, 77), thus help the team to remember who they are designing for (Lowdermilk 2013, 43).

Usually, personas are created using the research data, such as findings from interviews, and sorting the data by interest groups. Created personas should be relatable, so that the design team can relate to their needs. For that purpose, personas are often enriched with visuals and textual elements to make them appear more “real”. (Stickdorn & Schneider 2012, 172.)

According to Stull (2018, 281) personas should not give unrealistic expectations of their interest towards a service. Stull points out, that people are not by default interested in exploring a service even if there is no value for them at first. Hence, personas should present some amount of apathy so that they truly give the food for thought on how the service could be serving their needs and become of interest to them.

Service proposition

Before moving into more details and implementation, *a service proposition* should be formed. A service proposition includes both the needs of the service provider and the service user based on the gathered insights. (Polaine et al. 2013, 110.) Users should be involved in the design process until the service concept has proven to transform pain points into useful service features (Curedale 2016, 97). By sketching the big picture first and only then concentrating on the details, it will be easier to see early what needs to be changed (Patton 2014, 61).

Designing the service specifications as a heterogenous group activity may be more time-consuming than allocating the work only to selected professionals, but design activities conducted as a group are a way to gain a shared understanding of the new service. This also allows the later emerging user insights to be merged into the shared understanding of the service and turn out to be useful in further development activities. (Valminen & Toivonen 2011, 382.)

It is important for the service proposition to reflect the needs mutually; the service proposition can start to mostly reflect the needs of the service provider, which should not be the case as the service proposition to be desirable for the users as well as to the service provider. (Polaine et al. 2013, 113.)

Service blueprint

Movement is a feature of all services: the service user moves through a service towards their goal. Fluent movement through a service means being able to accomplish the task at hand easily. Using service design tools, this movement can be illustrated as visual journeys which

are read from left to right. (Reason et al. 2016, 16.) Thus, service process can be viewed as a series of activities (Grönroos 2015, 50; Stickdorn et al. 2018, 26).

Service design provides methods for visualizing services in a way which highlights the user aspect. Visual mapping helps to focus on what service users want, instead of what the service provider thinks they want (Curedale 2016, 12). Examples of visual mapping methods utilized in service design are service blueprints.

Service blueprint is a versatile tool which illustrates the journey which the user takes, the touchpoints that the user experiences and the backstage processes which the user does not see (Polaine et al. 2013, 93). Service blueprints give structure to a service, which in turn helps in designing a seamless service experience and can reveal the risks and opportunities in a user experience (Curedale 2016, 71).

In service blueprint, the activities between the service user and service provider are captured and organized into chronological series of actions, where a line of interaction and line of visibility indicate how the user interacts with the service and what is visible for them (Valminen & Toivonen 2011, 379). Physical evidence is illustrated in a service blueprint as a separate row, as the proof of service that has been taken place. Evidence is an important evaluation criterion for the service users and should be viewed as important elements of service. (Curedale 2016, 87, 89.)

Service blueprints are excellent in designing new services and improving existing ones. Blueprint as a method of visual mapping has a holistic approach. This is one benefit of using the method since the needs of stakeholders such as of the service provider and service user might be competing. (Curedale 2016, 13.) When the movement which the user is undertaking while travelling through the service is understood and designed, the user can eventually reach their goal (Reason et al. 2016, 18).

User stories

User-centric development approach views features as jobs to be done and needs to be answered, rather than *how* the job is done in practice. The approach can be manifested in specifications which embrace the user-centric view: they capture what does the user aim to achieve, rather than what should the system be capable of doing. A user-centric aspect to otherwise technical feature specifications is defining not only what should happen, but also how the experience should be like for the user. (Thomas 2020, 157-158.)

User stories are written specifications for software features and as a method, they are typical for agile development. As they do not need take a stand on how the feature should developed

in practice, a user story can let the development team themselves decide the best technical implementation. (Interaction Design Foundation 2022.)

A typical format of a user story is one sentence: as a user, I want to... so that... (Interaction Design Foundation 2022). In other words, a user story gives a definition for *who*, *what* and *why* (Wautelet, Heng, Kiv & Kolp 2017, 3). For instance: as a Team Leader I want to share my calendar availability with my team members so that they know when I am available for meetings.

User stories should be based on research. Qualitative research methods are a good for revealing the design potential which can be captured into user stories. (Interaction Design Foundation 2022.) As mentioned in chapter 4.4, user-centered design aims to avoid assumption-based design, and research-based user stories provide a reality-based development feature specification.

6 The empirical design process

The purpose of this case study was to gather understanding of the experiences from current product information delivery practices between the case company and its suppliers and to collect user insights in order to form the basis for the requirements for a new PIM supplier portal as a concrete outcome of the study.

The thesis writer contacted the Program Owner in fall 2021 offering the thesis work for the development program. The Program Owner suggested the thesis topic to the thesis writer, as it had been identified that there was a need to better understand the product information delivery related needs of suppliers and case company's internal stakeholders. After identifying the topic of the thesis with the Program Owner, a thesis agreement was signed, following the Arene's (2020, 6) ethical recommendations.

The design process was conducted almost completely online, due to Covid-19 pandemic and established remote working practices in the case company at the time of the study. The thesis writer decided to use Miro as a main tool for documentation as it was seen suitable for different phases of the study such as ideation, data analysis and visualizing results, but also to facilitate online workshops during the process.

Two Miro boards were used during the study. A private board was used for initial data analysis phase before processing it, and it was only accessible for the thesis writer. Second board was accessible to employees of the case company, who were working in the same development program the case study was a part of. The shared board was used in the process after the

initial data analysis phase. In addition to Miro, Word and Powerpoint were used during the process.

The work begun in January 2022 by the thesis writer familiarizing with service theories and identifying the mechanism of value creation in service. Next, the preliminary structure of the thesis was created, and the design process was selected. After selecting the Double Diamond design process, the thesis writer made initial suggestions for the methods to be used in the study. The design process and suggested methods were presented to the Program Manager as the thesis commissioner in January 2022 before proceeding forward in the process.

This case study was research intense, as it was focusing on the first three parts of the Double Diamond design process which are Discover, Define, and Develop. The implementation of the service was not included in the thesis scope and was scheduled to be done later the same year.

In the following chapters, the empirical part of the case study is described following the Double Diamond design process structure which was used.

6.1 Discovering the service context and user needs

The importance of research in a project is emphasized in design thinking (Luchs 2015, xxiii), service design (Stickdorn et al. 2018, 20; Ojasalo et al. 2015, 74) and user-centered design (Lowdermilk 2013, 12), which were introduced in the chapter 4. According to Ojasalo et al (2015, 74) the research phase can be the most time-consuming part of the design process, but as it is the base of the whole development, the time is well spent.

Interviews

In this thesis, interviews were used as a primary method to gather understanding of user context. As was pointed out in chapter 5.2, interviewing is an effective means to gather understanding about the context in questions. In addition, as was explained in chapter 5.2, conducting interviews in early phases of design process contributes to human-centric approach. It was proposed by the thesis writer and agreed with the Program Owner, to conduct the discovery phase using interviews as a method.

Semi-structured interviews were selected as the interview method. Two interview guides were prepared by the thesis writer: one for employee interviews (Appendix 1) and one for supplier interviews (Appendix 2). The interview guides aimed to find answers to the guiding questions which were:

1. How do we co-create most value with service partners through a digital portal?

2. How do we understand the service context and the future role of the digital portal in it?
3. What needs could be met in MVS, and how should we prioritize the needs in MVS and project roadmap?

The interview guides were partly similar, but some of the questions were different for external and internal stakeholders as they were all not applicable as such. In addition, the external field guide was refined after conducting the employee interviews, as some understanding on the context was already collected in employee interviews. It is a good practice to include duration estimations to each part of the interview (Portigal 2013, 41), which was also done. The interview guides were reviewed with the Program Owner, and some small edits were done before conducting the interviews.

Stickdorn & Schneider (2012, 120) point out that the focus should first be in finding the right problem, before thinking about how to solve it. Thus, according to Stickdorn & Schneider, it is necessary to understand the current situation from service user's point of view, which allows identifying the real design challenge. Hence, it was decided by the thesis writer to focus on understanding the current processes and the context in the supplier interviews rather than focusing on the angle of developing a PIM supplier portal. By doing so, the thesis writer also wanted to first validate the business hypothesis, that there is a need to develop the current practices in ways could be supported by a digital supplier portal. The case company employees had been informed about an upcoming development project related to a PIM supplier portal thus they were informed that the interviews were related to the same project.

It is important part of research ethics that the research participants are aware of where the gathered information is used and how (Silverman 2017, 59; Arene 2020, 7). Entering the interviews, the purpose of the interview as a business study and thesis research was explained to the interviewees. After explaining the purpose of the study, the thesis writer asked for a permission to record the session. Before entering the interview questions, the thesis writer asked if there were any questions the participant would like to ask, and if the interviewee was then ready to start the interview.

During the interviews the order of the conversation topics naturally varied so the order of questions was adapted accordingly by the thesis writer to follow the natural flow of the discussion, which is also allowed in a semi-structured interview introduced in chapter 5.2. In addition, when there were new topics raised by the interviewee, the interview could include additional topics as in addition to the questions in the field guide.

Before ending the interview, the thesis writer once more read through the field guide to be certain that all questions were asked, and all other practicalities had been gone through. In

one of the interviews the thesis writer realized at this point, that the purpose of the interview as scientific research had not been properly explained in the beginning of the interview. Hence, the purpose was explained before closing the interview, so that the thesis writer would have the permission to use the interview data not only as a source of information for the development task, but also anonymously in the thesis. As a reflection, this type of mistake could have been avoided by informing the interviewees about the thesis project in written prior to the interviews, which was taken upon as a learning by the thesis writer.

Employee interviews

It was agreed together with the Program Owner to aim for approximately six employee interviews and six supplier interviews which would represent different stakeholder roles to give a holistic view on the context. This initial number of interviewees was only an estimate. As Silverman (2017, 269) points out, the sample is appropriate when the findings start repeating itself, and this is called *data saturation*. Hence, it was decided to increase the number of participants later, if needed. The Program Owner gave initial suggestions on who to interview, as they were people who had shared their views or ideas regarding the topic previously and were likely to be interested in sharing their views in an interview. These candidates were also representing different departments and professional roles, which would give the desired heterogeneity to the scope of selected interviewees.

In addition to Program Owner, recommendations for employee interviewees were brought up by other members of organization, as they heard about the research method to be used in the development task and had identified key people to discuss with about the topic at hand.

Based on the recommendations, six employees of the case company were approached by the thesis writer by email or Teams chat. All approached interviewees gave a quick reply, stating they were willing to give an interview. This was interpreted by the thesis writer as a potentially positive signal of interest towards the topics to be discussed, and as a sign of motivation towards co-creation as was described in chapter 4.1.

Employee interviews were held in February 2022. Suggested duration for the interview was approximately one hour. Interviews were conducted remotely using a video call, which was an established practice at the time in the case company due to the Covid 19 -pandemic. The thesis writer had her video connection on in the beginning of the interview. The thesis writer intentionally did not require keeping the video on during the conversation, as she wanted the interviewee to guide the situation towards how they would feel most comfortable expressing themselves. Three interviewees preferred having their camera closed, and the thesis writer chose to close their camera in those interview sessions as well. In the remaining three interviews the video connection was on in both sides.

The interview followed the interview guide (Appendix 1). In the interviews with interviewees who had experience from working with the previously used system, some time was spent in discussing the aspects of what was learned from it. With others who had not used the previous system, more time was spent on analyzing the current situation.

In the interviews, the participants gave suggestions for potential supplier interviewees. All six employee interviews were conducted before moving on to the supplier interviews and finalizing the interview guide to be used in them.

Supplier interviews

The following six interviews of the discovery phase were representatives from the case company's suppliers. The participants were recommended to the thesis writer either by the employee interviewees or other business managers who had given their recommendations for interviewees by the request of the Program Owner.

The recommendations formed a group of six suppliers. There was heterogeneity in both size and industry between the interviewees, thus the chosen interviewees would be likely to contribute to the research with various aspects and experiences.

The initial contact about the interviews towards the suppliers was made by those employee interviewees, who already had collaboration with the suppliers in question. This was preferred by both the employees and the thesis writer, as there was a business relationship aspect to consider. To get several viewpoints within a single interview, the thesis worker decided to recommend having two people attend from the supplier company if possible. If two people would participate, the duration of the interview was estimated to be approximately 1,5 hours.

As was discussed in chapter 4.1 of the thesis, co-creational activities require motivation from participants. All potential interviewees except one replied soon, that they would be willing to be interviewed about the subject. One reminder was sent to the supplier who had not replied in a week, and soon they also informed that they would be willing to participate. The thesis writer concluded that there seemed to be motivation to take part in co-creation. However, the thesis writer believes the business relationship between the supplier and the case company could also influence the motivation to take part in suggested interview.

After the interviewees had stated they were willing to participate, the thesis writer approached the interviewees directly via email, and the suitable date and time was agreed. Eventually, as already mentioned, there were altogether six supplier interviews in the discovery phase. Four of the interviews were scheduled to have two representatives from

supplier side, but ultimately only two interviews had two participants from the supplier side, due to the second participant not being able to join the interview.

Number of interviews	Interview participants
2	2
4	1

Table 2: Number of participants in supplier interviews

The interviews were conducted online via Teams, which was an established way of working in the case company due to the covid 19 -pandemic. As in the employee interviews, the thesis writer did not want to set a requirement for having the video on. The thesis writer left the decision to be made by the interviewee, to make them feel as comfortable as possible to express themselves in the remote setting. As in the employee interviews, the thesis writer kept the video connection on when starting the meeting, and all interviewees responded by turned the video on as well without a request from thesis writer to do so.

The interview did not include observation or visual material to support the conversation, as the aim was to understand the experience of the current processes on a high level. However, some participants had independently prepared with, or spontaneously accessed during the interview, a template which they currently use to provide the case company with product information.

Indeed, observing how users relate to existing service can give useful information, and in addition, this type of material will help them remember the practices around them (Thomas 2020, 79). While the interviewees were looking at the material while they were talking, some useful insights were revealed. As a reflection the thesis writer concluded that visual material clearly helped the interviewees to remember how the current process is like. It could have been useful to offer all interviewees the possibility to view the template while they were sharing their experiences from the current process, even though the aim of the interviews was not to evaluate current tools in detail.

Interviewees shared various views, experiences, and opinions, which were partly conflicting each other. The interviews brought up a variety of different viewpoints and a rich reasoning behind them, which allowed the thesis writer to empathize with the different viewpoints of

interviewees. The thesis writer also considered the conflicting views to be an indicator that the interviewees were not being led on to demonstrate a single opinion by the thesis writer as an interviewer, but rather they had expressed themselves naturally. Some interviewees even expressed apologies during the interviews for being so up-front, which was only encouraged further by the thesis writer, as the aim was to hear their honest views.

Some interviewees had experience from using the previous service. In those interviews some time was spent discussing those experiences.

6.2 Analyzing the data

All interviews were manually transcribed word by word. Eventually there was a lot of raw data, as the interviews had lasted approximately 1-1,5 hours each and there were altogether 12 interviews. However, when user needs are thoroughly analyzed, potential areas for new solutions can be identified (Valminen & Toivonen 2011, 376), thus it was a positive problem that there was so plenty of material to work with.

Initially the idea was to have all data in one frame, but as it turned out there was so much data to be processed, it was decided by the thesis writer to divide the workload and start analyzing the employee interview data in one frame already when the supplier interviews were ongoing.

According to Luchs (2015, xxv), a feature of design thinking is that the data can be, and should be, simultaneously gathered and synthesized. As a result, it is possible to notice when there is enough data to enable moving forward in the design process, or if needed, continue to gather more data. During the interviewing process the thesis writer noted that the number of interviewees was suitable, as mostly same patterns started to repeat themselves in interviews. This was a sign of data saturation (Silverman 2017, 269); thus, it was acknowledged by the thesis writer that no more interviewees were needed at this point of research.

After transcriptions, the gathered data was still raw. As stated by Valminen & Toivonen (2011, 383), the research data gathered from internal and external user needs is not ready to be used without further processing, and it requires analyzing to understand the user needs behind the different ideas and requirements they have shared. It can be stated, that just writing down the user needs does not yet reveal where the design potential is, the data needs more processing.

The selected data analysis method was content analysis. In content analysis the aim is to crystallize the research findings into a simple and general form. As the outcome of content

analysis, the data is organized, but is not yet revealing the end results of the research. (Tuomi & Sarajärvi 2018, 117.)

With content analysis, the answers to the guiding questions will emerge from the research data as a result of combining data. The method proceeds from raw data towards more abstract meanings. To summarize, in this data analysis method, the researcher aims to understand the meanings in the content and the clustering is based on researcher's own judgement. (Tuomi & Sarajärvi 2018, 127.) Hence, the outcome of the clustering is derived from the data, but is still subjective, as it is interpreted by the researcher.

The content analysis was content based, which is also referred to as inductive content analysis. The unit for analysis needed to be decided first (Tuomi & Sarajärvi 2018, 122), and the thesis writer selected direct quotes from the interviews as the unit of analysis. The content analysis was done using Miro, a virtual whiteboard, in a private board which was only accessible to the thesis writer.

Altogether four Miro frames were created:

- a) frame for the content analysis of the employee interviews
- b) frame for the content analysis of supplier interviews

Two separate smaller frames would only concern the topics around the previous service which had been in use in the case company:

- c) frame for the employee interview data related to previous service
- d) frame for supplier interview data related to previous service

The purpose of the smaller frames (c and d) was to gather material for the learning story which was to be written later in order to summarize the experiences regarding the previous service as a benchmark.

In the beginning of the content analysis the material needs to be reduced from all data that is not relevant for the research goals (Tuomi & Sarajärvi 2018, 123). The thesis writer first read the interview transcription a couple of times, to identify emerging topics, after which parts of the interview were copied into Miro sticky notes as direct quotes. Interview contents were added to the Miro frame one interview at a time.

Gathered research data is confidential, and the anonymity of participants shall be protected (Silverman 2017, 59; Arene 2020, 7), thus the data was anonymized in Miro. Each interviewee was given a certain sticky note color, to identify the original data source even in the later stages of data analysis.



Figure 6: Frame a, interviewees are presented with different color sticky notes

Next phase of content analysis is clustering, where items under similar topic are grouped together as clusters. As an outcome, descriptions for each topic are formulated and the data is reduced even more. (Tuomi & Sarajärvi 2018, 124-125.) As the thesis writer began to cluster the sticky notes in the main frames, themes started to emerge. The clustering was dynamically developed while new data was brought into to board: big clusters were divided into smaller themes and new ones were created.

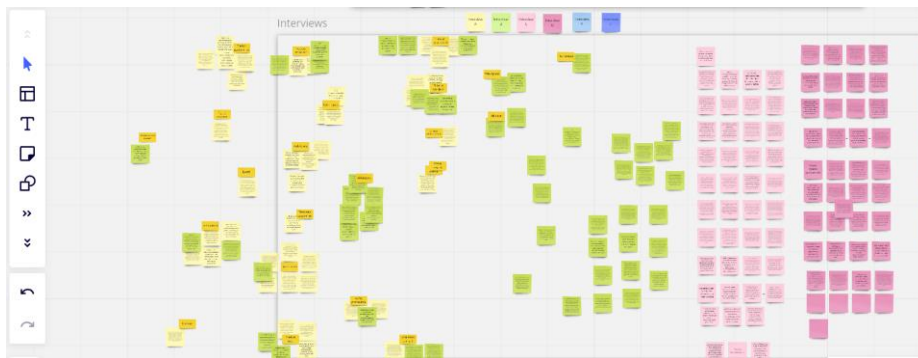


Figure 7: Frame a, clusters start emerging during the content analysis

Eventually, when all employee interviews had been reviewed and the data was brought into the frame, the clusters were reviewed again. Some new clusters were still created, and some clusters were combined. This phase of data analysis took some time, as there was a lot of data which needed to be organized and understood. At the same time, the supplier interviews were ongoing.

After all the employee interviews had been transcribed and moved to the Miro board, the thesis writer started working with processing the supplier interview data. The supplier interview data was processed similarly as the employee interview data: first transcribed, then read through a couple of times. Then, the data was anonymized and moved to the Miro board, to the other main frame created for the supplier interview data. As for the employee interview data, each supplier interview was given a certain color sticky note. If there were two interviewees in one interview, they were both presented with same color. Thus, the sticky note color referred to a specific interview, not interviewee.

The quotes concerning the previous service were moved to the smaller frame d which were assigned to them. Then, the data in the main frame for supplier interviews was clustered into topics. The clusters developed dynamically throughout the data clustering process.

Now, frames a and b with the employee and supplier interview data had data clustered into topics, and the data analysis process for both employee interviews and supplier interviews was in the same phase of data analysis.



Figure 8: Employee interview data (left) and supplier interview data (right) is clustered

In a content analysis process, after clustering the data under topics, they are abstracted. In this phase, the researcher once again removes irrelevant information. The remaining findings are crystallized by combining the clusters together into new, bigger and more theoretical headlines until they can no longer be combined. (Tuomi & Sarajärvi 2018, 125).

Initially, each cluster in both frames was summarized using white color sticky notes, capturing the key content of each cluster in a more summarized form, which was a way to crystallize the content into a more compact form.

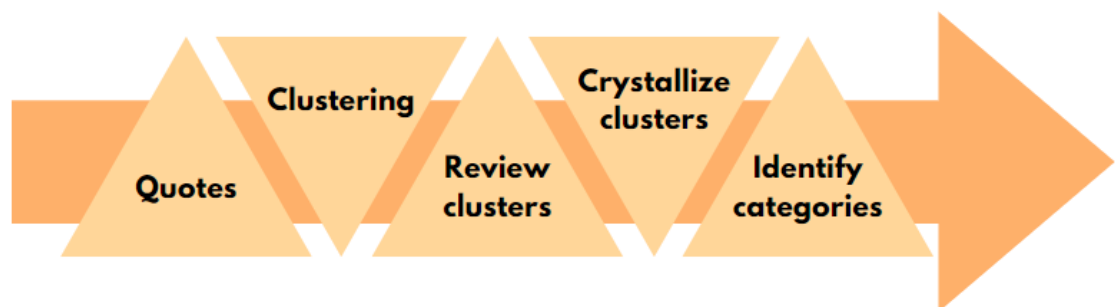


Figure 9: Content analysis process

In hindsight the amount of data was so big, that Miro was likely not the most convenient tool for processing it. However, at this point of data analysis the content analysis as a method had

familiarized the thesis writer with the content so well, that the thesis writer decided to proceed with the selected approach of using Miro as the content was already there.

At this phase of data analysis, the abstract headlines were still dynamically changing as they were gaining form. To triangulate and crystallize the data, a new set of frames was created to a shared Miro board of the case company. The board could be accessed by the case company employees working in the same development program. We will call this phase and the frame set a *research summary presentation*.

For each identified category the following topics were covered in the research summary presentation: identified patterns in the category, identified pain points in the category, and quotes supporting the findings. As the work progressed, a separate frame for insights was added to the research summary presentation, as they started to emerge as the result of reviewing and processing the data. Eventually, the research summary presentation captured the *context* which was revealed during the interviews. The details of the data are hidden from the thesis.



Figure 10: Research summary as a working document in Miro

The data analysis proved to be an interesting and time-consuming phase. At this point of the research, the data was considered by the thesis writer to be still quite raw, as it was mostly displaying what was learned during the interviews as such or what could be concluded about the context. However, the raw research data stored in the private Miro board was re-visited several times later during the process, and the processing continued all the way until refining the final Service Concept, which was reviewed against the collected data in the very late phase of the design process.

Writing a Learning Story about the previous service

In the past, the case company had had a digital service in use, which had similarities with the PIM supplier portal concept to be developed as a part of this thesis. The previous service had been used by a limited number of suppliers and case company employees in providing certain parts of product information. From organizational learning point of view, it seemed to be

relevant and timely to record the successes and failures of previous implementation to be able to take them into the new project as learnings. The thesis writer considered the previous service to be a form of iteration for the new service concept, which could potentially reveal useful information for the design purposes. Even if the technological implementation would likely to be different, there could be both practical and organizational insights to be gained from previous implementation and development process.

There was some documentation available about the system, such as user instructions, with which the thesis writer familiarized herself with. However, these documentations did not reveal which of the functions and features the users had found valuable, or how it was like using the system, which were now considered to be useful information for the new service development.

As described in chapter 5.2, storytelling in the form of a learning story offers a means to document not only what happened but how it was experienced, which enables the utilization of previous learnings in new projects. The thesis writer proposed to use learning story as the method for recording the learnings from the previous supplier portal, as the thesis writer aimed to collect both user experiences and technical aspects about the design. The use of the method was agreed with the Program Owner.

Writing the learning story begun by the thesis writer loosely structuring the story based on existing documentation, such as instructions of the previous supplier portal. By doing so, the thesis writer aimed to document the key features in the previous implementation while familiarizing with the system basics. In the next phase, the experiences from using the service were gathered as part of the internal and external interviews. There were altogether 7 supplier or employee interviewees who had experience from using the portal.

The interviewees for a learning story should represent a wide group of people involved in the project of interest with different roles (Thier 2018, 19). In this study, the interviewees represented different roles in the system as following:

User role	Number of interviewees
Supplier	3
Internal user role A	2
Internal user role B	1
Internal user role C	1

Table 3: Interviewees represented different user groups of the previous service

The interview guides (Appendix 1 and 2) included questions related to the previous service. The part of the interviews where the previous service was discussed or mentioned, were separated from other data in interview data analysis phase. Data was analyzed in Miro virtual whiteboard using content analysis where the sticky notes which were related to the previous service were moved to the smaller frames c and d which were assigned to them. Frame c was assigned to employee interviews and frame d for supplier interviews.

In both frames the data was first divided into strengths and challenges, after which the data was clustered based on the topic. These clusters helped the thesis writer in structuring the Learning Story. Eventually, the clusters were copied to a new frame so that the data gathered from supplier and employee interviews could be processed further using one frame.

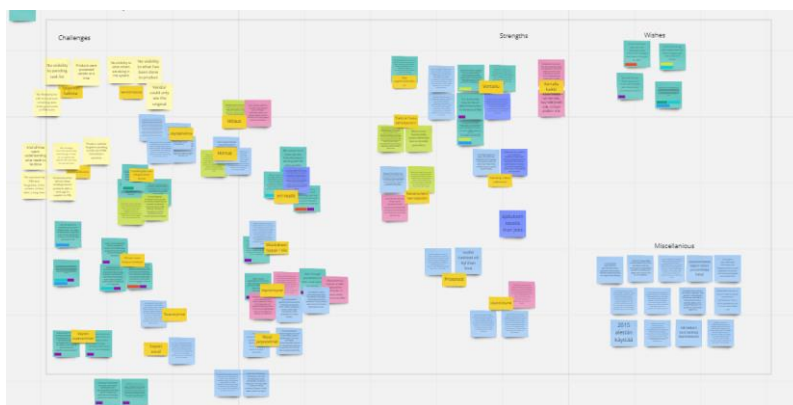


Figure 11: Content from frame c and d were processed using a new frame

The data analysis phase revealed the truly meaningful aspects in the previous service from user perspective. This resulted in deleting completely some initial parts from the learning story draft which was written by the thesis writer based on user instructions and assumptions of relevant features. It was concluded by the thesis writer that as they were not mentioned by any of the interviewees, they seemed not to be something to document in the learning story, rather only represented the bias of the thesis writer herself. Hence, the initial assumptions about meaningful features of the old solution proved to be only partially relevant for organizational learning perspective.

The eventual Learning Story is introduced in the next chapter as a part of results of the discovery phase.

6.3 Results from discovery phase

The aim of the discovery phase was to empathize with service users' context and to identify how product information delivery process from product suppliers to the case company should be improved. The discovery phase revealed pain points in current processes, which offered a fruitful ground for design. There were certain strengths and learnings identified in current processes, too. In addition, a Learning story was written regarding a service which had been in use previously to gather the organizational learnings related to a past service.

In this chapter, the results of the discovery phase are introduced. The detailed findings and ideas from the interviewees are excluded from the thesis and provided separately solely for the use of the case company. However, to provide necessary transparency according to responsible conduct of research (RCR guidelines 2012, 32), the main results are introduced next.

Discovery phase included 12 semi-structured, remote interviews of 1 - 1,5 hours. Six participants were working in the case company, and they were interviewed individually. In addition, there were six supplier interviews. Four supplier interviews were individual interviews and in two interviews there were two participants present from supplier side. In total, 14 people participated in the interviews.

The interviews revealed that many experiences were similar between the suppliers and the employees. As a result of the data analysis phase, user needs were identified in the areas of manual tasks, processes and communication, cognitive load, and developing the mutual business. Supporting quotes together with the role of the respondent, are introduced.

Manual tasks

Interviewees from both case company and supplier side expressed spending time with manual tasks related to product information management, such as data customization and reviewing. In chapter 2.2. we discussed the phenomena of information asymmetry and its practical implications, which was now described as practical experiences by interviewees.

According to the interviews, the requirements for product information have increased. Both case company employees and suppliers expressed that product information related work has increased during the recent years and that product information management takes time.

“Product information takes nowadays more and more time...” (employee)

The case company employees expressed, that it is typical not to receive the data in the format it is supposed to be in. Whether the information is meeting the requirements by case company varies, which results in sending the data back to supplier or the case company employee doing manual corrections.

“...we look at the arriving data, is it the way it is supposed to be in, and usually it is not...” (employee)

Sending the data back and forward until all the needed information has been collected in the required format frustrated both stakeholders.

“It is not the biggest task to provide the data (to the case company), but twisting it back and forward, when we have already filled in the data and then we get it back as a boomerang, that it should be another way...” (supplier)

“What frustrates me the most is that the files are sent back and forward because the arriving data is not what it should be...” (employee)

“(Data templates) need to be thrown back and forward a few times...” (employee)

Based on the interviews, suppliers provide product information for several customers, and each has their own requirements and templates for requesting the data. This means that the suppliers need to make manual adjustments to the original data they have due to information asymmetry, causing manual work and frustration:

“Dear Lord, as there are many actors and when you start doing these (data templates) for different retailers... customizing requires a lot of effort, it is a lot of work” (supplier)

“... it (customizing) always brings the human factor. It makes it difficult and creates the possibility for error.” (supplier)

The current processes around sharing product information require manual work which was raised as a major pain point for many respondents. In the interviews, many practical ideas on how to reduce manual work were shared. These ideas are excluded from this thesis as some make actual specifications for the new system.

Processes and communication

It was acknowledged that excel and email are a standardized tools in the context of sharing product information between organizations. Email as an information sharing tool is vulnerable for human errors and important emails getting lost in the way, as was expressed in the interviews:

“It is always the case... that some templates get lost” (employee)

Information of products is gathered to the case company in pieces. Based on the interviews it needs to be allowed to gather the information in pieces in the future as well, as not all necessary product information might not be available for the supplier yet when the product information sharing with the case company begins.

The current processes of the case company slice the required product information into data sets, which are handled by different employees of the case company. The employees believed that the suppliers would like to be offered with the possibility to deliver all product information at once in the future, if it is available for them already when the product information sharing begins:

“... it is an extra step that another person requests the images afterwards” (employee)

“I think they (the suppliers) would like to submit all data at once, so that they don’t need to remember to submit (parts of information) here and there...” (employee)

In the interviews it was noted that the role of product information in a person’s work varies between people. Some spend majority of their time with product information related topics, whereas others work with product information only occasionally. Based on the interviews, there are also seasonal workload peaks of product information management related tasks:

“Typically, when the product information is needed it is the busiest season...” (supplier)

“It goes in pieces; I don’t do it all the time. There are times I don’t need to do it (work with product information)” (employee)

From the point of view of this development project, it is worth acknowledging that it is likely that some users are using the new service more than others, and that there can be times

when a user does not need to access the system for some time. Hence, all users are not likely to develop a routine for using the service.

The interview data suggested, that among other features, the interviewees prioritized easiness of using the future system.

“(The portal should be) easy, clear and intuitive for the user, so that you don’t need a 30-page manual to learn what happens from each button” (employee)

In addition to frequency of managing product information related tasks, the datasets handled by different users vary. It was concluded based on the interviews, that there is variation in how the product information related work is organized in different companies and even within different units inside one company. A user can be working only with a certain part of data while another person takes care of the rest, or one user can be responsible for various aspects of product information.

The cognitive load

As mentioned, when a supplier needs to submit product information for the case company, they don’t typically have all product information available at first. Some parts of the information are ready before others. The order in which all parts of product information is available for suppliers themselves so that they are able to provide it onwards to the case company, varies between suppliers. As not all product information is not available immediately, it partly needs to be collected afterwards. Based on the interviews, remembering to get back to missing information seems to be the responsibility of the case company.

“... you don’t even remember later which products were supposed to be filled in afterwards (because all data is not yet available)” (supplier)

“For those (products) that are missing information (the case company) will request from us afterwards and they get fixed” (supplier)

“...someone from (case company’s) side asks to send the missing images if something is missing” (supplier)

However, getting back to pending tasks requires remembering from case company employees, too:

“It is a matter of yourself remembering (to get back to the missing information)” (employee)

“You don’t necessarily have any reminder and don’t remember to get back to the supplier who you requested the information from two weeks ago, that could they send the missing information” (employee)

“Sometimes we don’t get the information we need or at least in the required schedule” (employee)

It was not easy for all suppliers to identify what information is required from them and in which format. Experience and education on the topic help.

“There are many headlines (for requested datasets) of which you don’t even necessarily understand what it means because it is obviously meant for another type of product” (supplier)

“Of course, since I have worked a lot with it... I know that ok, I don’t need to fill in those fields” (supplier)

“Not knowing what is obligatory and what is not obligatory...” (supplier)

While gathering product information requires efforts on both sides, case company employees are guardians of data accuracy:

“The aim is of course that we get enough information from the suppliers to be able to open the products in the system correctly” (employee)

Developing the mutual business

Based on the interviews it was concluded that product information management tasks can be time consuming. Especially if a person is not working in a role which is specialized in product information management in specific, the time used with product information can be considered taken away from other tasks related to developing the business. This was something brought up by both case company and supplier representatives.

The interview data showed that as some parts of product information were not considered to be business critical the most urgent and crucial pieces of data were prioritized. Hence, other parts were left with less attention.

“I need to consider myself... what is the (most important part of information) (the case company) need so that you can place the order” (supplier)

“The main role is on that part of information which is required to create the product (in the case company system)” (employee)

Ownership of product information proved to be an interesting topic. In the interviews it was noted that internal ownership in the case company was clearly defined, but that in addition, the internal owners of product information considered parts of it to be owned by the suppliers. Thus, initially it seemed that the ownership of product information is shared; part of the information owned by the supplier and other parts owned by the case company. An insight discovered by data analysis was that in practice, the *stewardship* of supplier-owned product information seems to be shifting from supplier to the case company. After the initial supplier input and supplier's product existing in case company information systems, the responsibility of enhancing and optimizing the product information seems to be shifted from supplier to case company.

In practice, suppliers seemed to trust that the case company takes care that the information regarding their products is up-to-date.

"That I would go and see (our products on) all our customers web pages,... it would be good but there is just no time." (supplier)

"I don't know what the value for me would be in seeing what you (the case company's systems) have... we provide you with what you need and you use it as you see best" (supplier)

As a more general remark, many interviewees expressed interest in joining the design process by commenting on or testing a new system. For the thesis writer it was encouraging to note, how welcome and useful a new service could potentially be to future users. The thesis writer believes that offering to participate to the design process was a sign of motivation towards the project at hand, which is also essential for co-creation as stated in chapter 4.1.

Learning story

As a result of the thesis writer familiarizing with the instructions for the previous service and the results of interview data analysis, a 10-page Learning Story was written. The format was a word document with two columns. The left column represented the practical implementation of the previously used service, and the right column captured how the experience of the implementation was like. The Learning Story is not published in this thesis since it is considered to be including business-sensitive information.

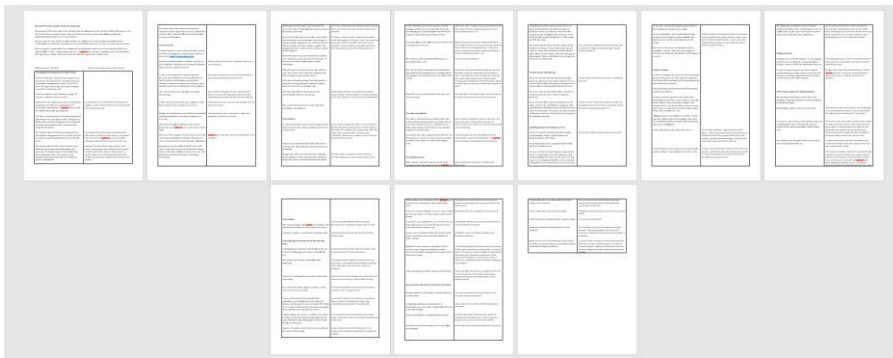


Figure 12: Learning Story captures how previous service was experienced

The Learning Story was distributed to the employees, who had been contributing to it as part of the interviews, and they were offered to read and comment the story. Eventually, the interviewees did not give any comments to the learning story. One interviewee mentioned that they could not contribute due to lack of time, and others did not comment at all. Next, the Learning Story was saved into a shared folder where it could be later accessed by people onboarding the development project.

As a reflection, the method of learning story could have been explained to the interviewees during the interviews in more detail, which could have given a motivation for them to read and validate the story once it was handed back to them. The Learning Story still gave a valuable addition to the research, as it revealed successes and defeats in the previous design from user viewpoint.

From the Learning Story some important learnings were identified and could be derived to the new PIM supplier portal service concept, as was intended. These learnings were used later in Service Concept as such and were also later validated by users as desirable service features. As the Learning Story was documented and saved to a shared network folder, it was also easy to access it during the project when needed, to evaluate some pros and cons related to previous feature implementations.

6.4 Defining the user needs

After conducting the interviews and the data analysis, the thesis writer was informed by the Program Owner about an additional employee user group, which had a specific user need. The Program Owner suggested the thesis writer to evaluate if there should potentially be an additional feature to be included in MVS, based on the specific user need brought up by the new user group.

As the initial research had already been conducted with a relatively high number of interviews (12), the thesis writer decided to move forward in the process and instead of going

through a new round of interviews, validate the initial findings and discuss the additional user need with the new potential user group by utilizing focus group method. The first six employee interviewees now formed user group 1 and the new user group was user group 2.

Focus group as a method was described in more detail on chapter 5.2. It is an efficient method to gather information and a variety of viewpoints in a short amount of time. In this case, the focus group sizes was smaller than in a typical focus group, as there were only two participants and the thesis writer acting as the facilitator. Otherwise, the session followed a typical setting of a focus group, where the facilitator asks questions and sets the scope of the conversation but does not bring their own views and opinions to the content of the discussion.

The duration of focus group was 1,25 hours and the session was organized online in Teams. The participants also gave their written consent to use the workshop as an information source for the thesis using a chat-function of the meeting platform. The thesis writer decided to conduct the session by sharing the screen in Miro and acting as the note taker, while the participants could discuss based on given topics and seeing the notes that were made and could ask to revise them if needed.

The focus group meeting agenda was based on 8 questions which aimed to identify if and how the pain points and needs of this focus group would be different than the ones identified in the previous research phase. The goal was to test if answering to the needs of the previously interviewed users would also answer to the needs of the new user group.

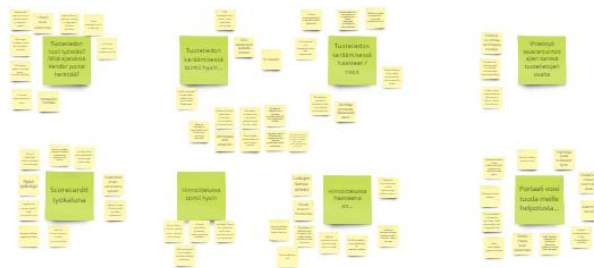


Figure 13: Focus group documentation in Miro

The 1,25 hours duration for the focus group turned out to be just enough for the participants feel that they had nothing more to add after a vivid discussion. The focus group revealed consistencies and inconsistencies with the pain points and needs identified in the initial research phase.

As a result of the focus group it was acknowledged, that the pain points which were identified earlier also were experienced by the new user group. However, there was clearly a new need that made the user group differ significantly from the first user group.

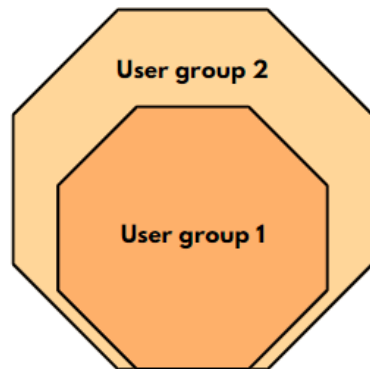


Figure 14: User group 2 had an additional user need

The need described by user group 2 was related to a feature which some interviewees in user group 1 had explicitly stated they would not see useful at this point, or which they think is very complex to implement in a useful way. In addition, the feature had also been mentioned as a part of the Learning Story, as something which had been removed from the previous implementation due to its complexity. Based on the initial research, the thesis writer would have decided to out scope this feature from MVS, but now the new user group found it to be very useful for them.

The reason behind the differing needs between the two user groups, despite them both presenting employees of the case company, is found from different practices across the business units. Group 1 already had established a fluent process for the feature in question, whereas group 2 did not, thus they were in real need in developing a process around the feature. Otherwise, the needs seem to be similar enough to start designing a service concept that could be benefitting both user groups.

Visualizing the user needs

After the data analysis, more data processing was still needed to crystallize the user needs in a way which also could be communicated onwards internally in the case company. According to Stickdorn & Schneider (2012, 121) the research data needs to be processed into visual form, as it is the way of an abstract service to gain form. In this phase of the design process, user personas were chosen as a method to visualize the user needs and communicate them to other internal stakeholders later in the process. In addition, a service proposition was visualized to be able to gather early user feedback and validate the desirability of the proposition.

User personas are fictional characters, but they are based on real user needs (Lowdermilk 2013, 43). Personas as a method were introduced in more detail in chapter 5.2. As it was time to create user personas based on the conducted user research, another person was assigned

to the project with the thesis writer. This person is referred to as the Co-Designer. Creating user personas together with the Co-Designer turned out to be an opportunity for the thesis writer to share the research findings and onboard a new member to the project. The Co-Designer had years of working experience with the users and the context, as well as being familiar with the previous service of which the Learning Story was written.

As already mentioned, the case company had adopted a hybrid way of working during covid-19 -pandemic, and remote meetings were at this point considered to be the default form of a meeting and suited better for both participants schedules. First persona workshop was held as an online workshop with the Co-Designer 31.3.2022, using Miro as a tool for virtual collaboration. In the workshop, the thesis writer was acting both as the facilitator and participant.

The available time resources for the Co-Designer to participate were limited. It was acknowledged that the reserved duration of 2 hours would be too little to both introduce the research data and create personas. As a conclusion, the aim was not to finish the personas in the same session but begin the work with them.

Image:		Fast learner Interested to follow up Detail orientated Automation saves time Frequency of use	
Name		Motto:	
Motivations / goals:		Expectations towards the system:	
Needs:		Past experience / benchmarks to:	
Frustrations:		Priorities:	

Figure 15: Thesis writer prepared a persona template

Typical steps for creating personas are the following (Calabretta & Gemser 2015, 4d-4e):

- 1) identify the persona type on a rough, headline level
- 2) gather research data from multiple sources
- 3) set the key characteristics that separates the personas from each other
- 4) refine 3-5 personas by giving them a character

- 5) visualize the persona with images and give the final touches with quotes and demographic background information

After a warm-up exercise and introducing the agenda for the workshop, a research summary was presented to the Co-Designer by the thesis writer. Followingly, the workshop followed the steps described above. First it was discussed and agreed how the personas would be created: based on profession and employer, or purely based on user needs. It was jointly decided to start building the personas based on user needs and at this point not to pay any attention to if the persona would be a case company employee or a supplier. The initial aim was to create 3-4 personas.

After deciding the approach for personas, possible key definitions or headlines for personas were ideated together using sticky notes. Four persona headlines were formed. Once the headlines were decided, participants started to jointly elaborate on the persona together one persona at the time.

When the workshop was closed, personas 1 and 2 were well on the way to form, persona 3 was started and persona 4 was on an idea-level. Second workshop with the personas was agreed with the co-designer for the following week, to keep everything still fresh in mind.

In the second workshop of one hour, the personas were refined. It was decided to combine personas 3 and 4, as they shared some needs and pains. It was also agreed that it could be easier for future use to be able to communicate the user needs using only three personas.

As a result of the two workshops, three user personas were created: control-seeking Tarja, efficiency-seeking Robert and guidance-seeking Otto.

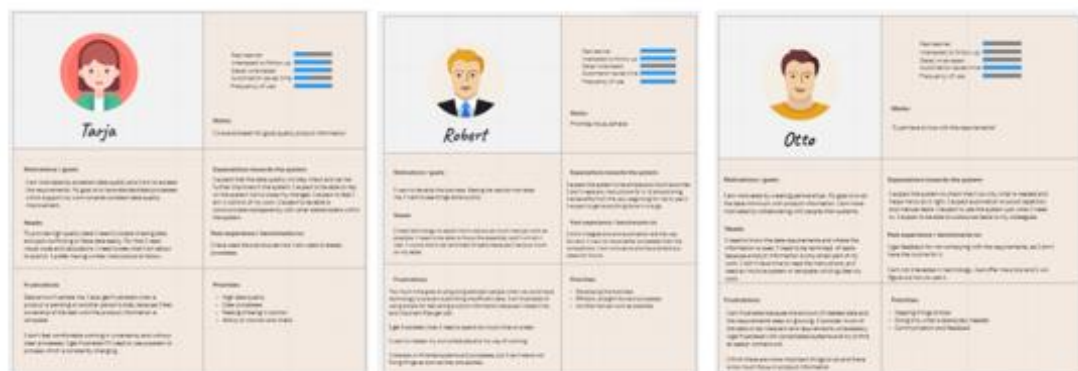


Figure 16: Three user personas: Tarja, Robert and Otto

service and did not request to change anything at this point of the process. At this point, the service consisted of four categories:

- a) automation and information validation
- b) process fluency
- c) less to remember
- d) developing the collaboration



Figure 18: To gather early feedback, service proposition was visualized using Powerpoint

6.5 Developing the Service Concept

After the service proposition had been drafted by the thesis writer, feedback was gathered from the employee interviewees of User group 1 who had been taking part in the research in the discovery phase and represented MVS users. These interviewees were invited to give early feedback on the proposition. The aim of the organized feedback session was to adapt the proposition according to feedback and to make sure the concept development is moving to right direction.

Besides thesis writer aiming to improve the concept through iterating it with users the workshop also aimed to respond to a wish expressed by the interviewees that they were hoping to have the possibility to comment and to be heard during the design process.

Gathering the feedback of the concept draft was held on 20.4.2022 as an online workshop in Teams. Two out of six interviewees were not able to join the session, and they were offered a separate session where they could give their comment if they wished. Eventually these additional sessions were not requested, thus the feedback was only gathered during the

common session at this point. In addition to the four interviewees who joined the session, the Co-Designer attended the session to hear the early feedback from the users.

During the session, the thesis writer presented the design process in short, explaining what had been done after the interviews, and introduced the PIM supplier portal service proposition for the participants. In addition to allowing open conversation around the proposition, the thesis writer presented questions while screen-sharing the illustration such as:

- How do you feel about this suggestion?
- Should we change something?
- Is there something missing?

While the participants shared their views on the proposition, the Co-Designer took notes. The discussion was active, and participants shared their views and priorities along the session. Participants stated that the overall concept was going to the right direction. They gave feedback on certain features and indicated complex areas that need further investigation and definition due to different approaches and practices inside the organization. These areas were concerning how to validate the arriving data suppliers deliver, and some different existing practices across business units.

Participants shared concerns regarding the easiness of using the service, as they thought it was a high priority. Thus, usability of the service was validated as a very important aspect for the service, which had already been identified both in the theories and in the discovery phase and was now confirmed.

The service proposition had been ideated based on the discovery and define phases. In addition, one feature had been included to the proposition as it was pointed out by the user group 2. This feature was added to the proposition by the thesis writer despite the initial research and learning story indicating the complexity, to now be jointly evaluated by the workshop participants. The particular feature was quickly noticed by the participants, and it raised a vivid discussion. Workshop participants thought the feature would likely not be bringing them additional value. In addition, they thought it to be highly complex area which needs a lot of additional definition to provide value. The participants unanimously opted for removing the feature from the early concept.

Services should be designed for specific user groups with certain shared goals since trying to design for everyone will result in a design that does not work for anyone (Curedale 2016, 73; Stull 2018, 71). This became evident; user group 1 and 2 had a conflicting need. Summarizing the session, the value of early user feedback was apparent. In just 1,5 hours spent in a dialog with future service users it was possible to get valuable feedback on the concept and to gain

a deeper understanding of how the implementation should be like. In addition, the users were able to clearly state there was one feature they did not see bringing them value.

Followingly, it was possible for the thesis writer to put the feature to aside of the service scope already in service proposition phase before collecting further requirements and moving forward in the design process. Instead, the development could focus on aspects which would be benefitting both user groups.

In addition to practical development ideas and feedback, users shared their concerns and wishes which added the designers' understanding of their context, expectations, and fears towards the service, which was seen as an additional benefit from the session by the thesis writer and Co-Designer.

Developing the proposition based on feedback and further triangulation

After gathering the early feedback on the proposition, the thesis writer still continued working with analyzing the collected data in the Miro board to illustrate the future service as a service concept which would answer to the user needs. As was explained, some key features of the service had been already validated with employees, but the thesis writer thought there were still more aspects in the research data to be analyzed.

This thesis approached the development task from user-centered perspective. When an organization has a development challenge, it is often initially formulated from the company's view as the service provider. Hence, one important task of a service designer is to reformulate the challenge at hand as it is described by the service users. (Stickdorn & Schneider 2012, 120.) In this case, the service users were the employers of the case company and the suppliers providing product information. As the interviews during the discovery phase did not focus only to delivering and receiving data but also to the context, thesis writer's understanding about the needs surrounding the processes was increased. As a result, the development need was refined.

The development need which initially was focusing on enhancing product information delivery from suppliers to the case company, was reformulated based on research findings, which is typical for service design (Stickdorn & Schneider 2012, 120). Based on the gathered research data it seemed that what user needed in practice was a digital service to *facilitate the collaboration* in product information sharing context. Hence, the focus was shifted from data management practices more towards the aspects of collaboration.

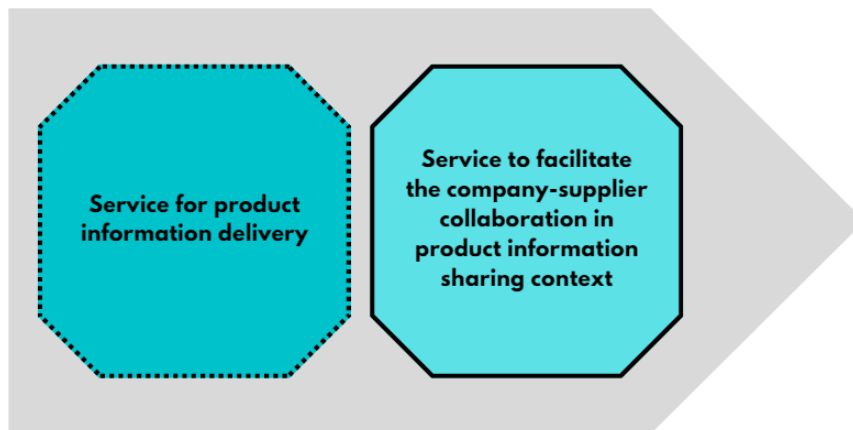


Figure 19: The design challenge was refined as a result of the discovery phase

After gathering initial user feedback for the service proposition, the concept was developed further by the thesis writer. At this point of the design process, the thesis writer spent some time with the research data once more, to be sure not to have missed anything, and empathize with the users once again using the raw data and user personas.

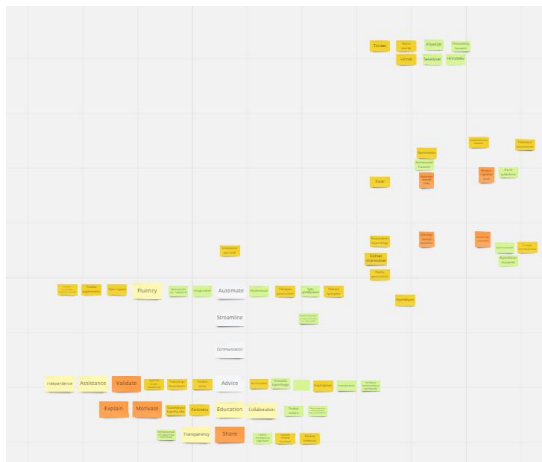


Figure 20: Triangulating the data in Miro board towards the Service Concept

As a result, the Service Concept was illustrated in a visual format. The Service Concept is presented in chapter 7.2. The detailed service features are not published in this thesis since the concept is considered to include sensitive business information.

Lastly, as the Service Concept was a result of the thesis writer's triangulation and external triangulation was only conducted during the user feedback session, the Service Concept was validated by the thesis writer against the original research data. The thesis writer wanted to make sure the elements in the Service Concept were truly supporting the research findings,

and not have started to reflect her own biases during the ideation. The validation was conducted using an additional frame in the Miro board.

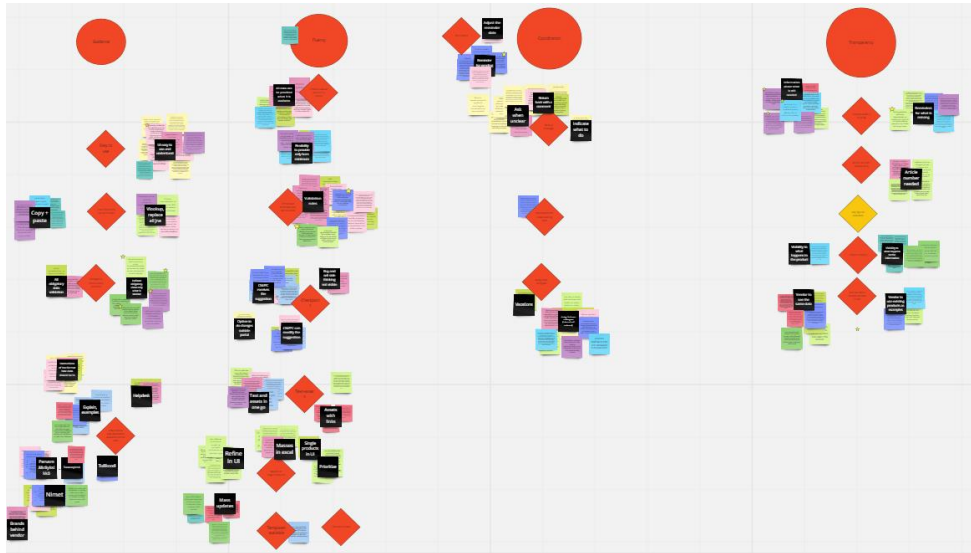


Figure 21: Aspects of Service Concept (red color) were validated against quotes (other colors) in Miro board

MVS requirements as a service blueprint

As already mentioned, an objective for the case study was to define the requirements for minimum viable service (MVS). The thesis and Program Owner discussed the high-level functionalities which could be included in MVS and replace some existing processes. Once the scope of MVS had been drafted, the MVS requirements needed to be documented in such a way which could be easily communicated with the software developers and further modified during the process if needed.

This thesis approached the development task of PIM supplier portal as a service and from a user-centric approach. Services are not easy to document as the experience of using the service is a crucial part of it and traditional methods such as requirement specifications lack the experience aspect (Reason et al. 2016, 127). Hence, the thesis writer considered it to be useful to utilize method applicable for service development.

Service user's goal is the base for a service blueprint (Curedale 2016, 73), and it was suggested by the thesis writer that service blueprints to be used for MVS process visualization. Service blueprint as a method was introduced in more detail in chapter 5.2. where it was also concluded that blueprinting is a well-suited method for designing new services. The approach was agreed with the Co-Designer and the Program Owner, who were not previously familiar

with blueprinting. At this point of the design process the thesis writer needed to continue the design process alone.

While illustrating MVS requirements, two user personas was empathized with by the thesis writer to keep the user needs close. Efficiency-seeking Robert was selected to present the employee user needs, while guidance-seeking Otto was selected to represent the supplier user needs. Based on the conducted research, Otto would present the need for a service which would be easy to use independently by external service users, while Robert would seek benefits for the case company through increased process efficiency.

First, a simple service blueprint template was created in Miro.



Figure 22: Service Blueprint template was created in Miro

The required steps were added to the service blueprint template using yellow sticky notes. The simple format would allow the blueprints to be quickly adapted along the development process, when needed. Eventually three service blueprints were drawn to give structure to three features which would be included in MVS. The blueprints were iterated by the thesis writer until there was nothing more to remove, but the service could take place. The eventual service blueprints are introduced in chapter 7.1.

User stories

Designers and developers often have a different approach to feature specifications, as designers tend to look at features from a wider, user-centric, and experimental perspective, while the developers prefer having detailed requirements. To get aligned, a common way for communicating needs to be established. When approaching the development of features, it is advisable for designers to understand the team's current ways of working and adapt to those. (Thomas 2020, 156.)

At this point of the process, the Service Concept and three service blueprints had been visualized, which captured the key features of MVS. Delivering the concept was left out of the thesis scope. However, to close the thesis scope, the thesis writer decided to establish the process of bridging the gap between the service as a blueprint and the development specifications, which would be needed in the next phase to be able to deliver the design to the developers. The development specifications in the form of user stories were already an existing practice utilized in the Development Program, which offered an excellent chance to tie together the new method of service blueprinting into an existing company practice of user stories.

Specifications of one service blueprint were documented as user stories, which as a method were introduced in chapter 5.2. In short, user stories communicate the goal of a user and the action they want to achieve, thus represent a user-centric approach applied in this thesis. The thesis writer wrote user stories for each step of the first blueprint where development efforts were required. The thesis writer acknowledged that the user stories were likely to require further iteration when they would be introduced to the developers outside the thesis scope.

7 Results of the case study

The purpose of the thesis was to enhance the product information delivery process between the case company and its suppliers. As a result of this study, development needs as well as the strengths in current processes were identified (chapter 6.3) which allowed the thesis writer to identify design potential for future service.

As a continuation, the objective of the thesis was to design the concept for PIM supplier portal and identify the elements of Minimum Viable Service. This work was conducted based on the identified user needs and service context, including documenting and utilizing the learnings from a service which had been in use in the past in the form of a Learning Story.

As a result of the case study, there was a shift of paradigm from designing a digital tool into designing a digital service concept. The service logic theories and the concept of value co-creation were explored. It was understood that both service provider and service user can be active actors in value creation, contributing to and receiving the value from PIM supplier portal as a service which facilitates the collaboration between these stakeholders. A responsive, intelligent system can offer a value co-creation platform.

It was noted in the theoretical part of the study, that information asymmetry is a source of competitive advantage. The designed Service Concept of a PIM supplier portal is an effort to balance in between making sharing of product information easier for people while

maintaining the business benefits permitted by information asymmetry. In practice, the PIM supplier portal aims to tackle practical implications related to product information sharing caused by information asymmetry and different data-related requirements between systems and organizations. Aspects of collaboration became a key element in the Service Concept.

As a result of the case study, the full process from initial user research to writing the MVS development specifications of a PIM supplier portal for system developers was established. New ways of working were introduced and taken into use in the Development Program; Service design tools such as service blueprints and user personas help keeping the user in focus when designing a new system and offer a user-centric starting point for future development activities.

Next, the Service Concept as well as the answers to the guiding questions are introduced.

7.1 The Service Concept

A Service Concept for a PIM supplier portal was developed as a concrete outcome of this study. The service aims to facilitate the collaboration between the case company and its suppliers in four areas in product information sharing context. The areas are guidance, fluency, coordination, and transparency.

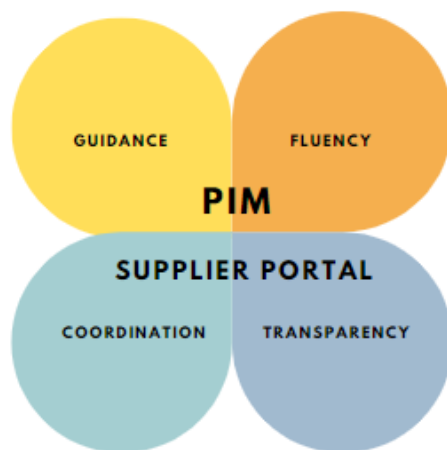


Figure 23: The service facilitates collaboration in four areas

The four categories each cover several features which support the collaboration in product information sharing context and are based on the insights gathered during the design process. The detailed service features are left out of the thesis by the request of the case company but are introduced next on a high level.

Guidance is needed for the users to be able to accomplish their tasks independently. The users of the PIM supplier portal will consist of supplier representatives and the case company employees. The value provided through a self-service depends on the skills user possesses for using the system (Scherer et al. 2015, 15). If a user is not able to manage the task by themselves, they will contact the service provider (Scherer et al. 2015, 12), in this case the case company representatives. This could be avoided by offering a well-guided user interface which responds to user's actions.

It was stated in the results of the discovery phase, that the case company employees and suppliers need to send product information data templates back and forward. Fluency can be provided by PIM supplier portal which indicates the call to action clearly. In addition, fluency can be achieved by allowing process flexibility which supports delivering product information either in pieces or everything at once, if available.

Coordination and collaboration are in the heart of the Service Concept of PIM supplier portal. The service is based on human input: service users adding product information into a system. Through the portal, stakeholders work together asynchronously towards a shared goal: sufficient product information which is stored in correct format. Thus, features to support coordinating the tasks between service users are needed.

As was stated in the results of the discovery phase, a cognitive load is related to product information management. The modern technology could assist reducing the cognitive load related to remembering to get back on pending tasks, for instance, which is also related to coordinating tasks.

Transparency is related to the asynchronous collaboration. In order to know what needs to be done and what is happening next, the system should provide sufficient transparency for the status of tasks as well as the call for action.

All aspects of the Service Concept for PIM supplier portal - guidance, fluency, coordination, and transparency - can be viewed from the perspective of users having a dialogue through and with PIM supplier portal. Users and system engage in a direct interaction, in which both stakeholders' actions are affected by the action of the other (Grönroos & Gummerus 2014, 217). As a user performs an action, the system responds with a feedback or action, or signals another user to respond. Grönroos & Voima (2013, 146) suggest, that these direct interactions play a key role in value co-creation. Hence, the thesis writer believes that the responsiveness of the system is important for users to receive value from using the service. In practice, the users should be able to interpret the feedback, action or call to action by the system, so that they can respond in a desired manner eventually reaching their goals.

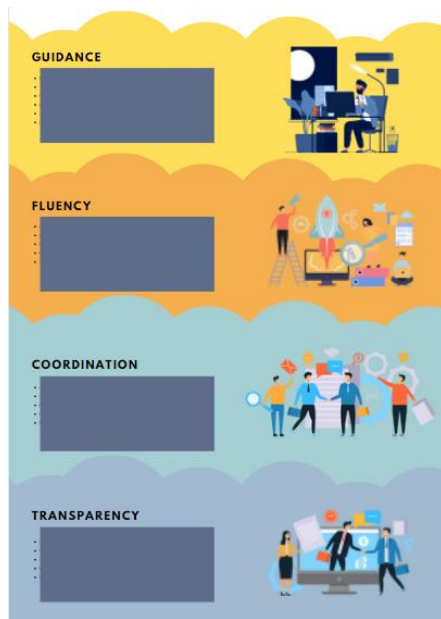


Figure 24: The Service Concept for a PIM supplier portal to facilitate collaboration

The process of delivering the service concept as MVS to development

The development work was left out of thesis scope, however in the thesis the process of delivering the design to the developers was established. Hence, to bridge the gap between the Service Concept and the upcoming development work in practice, MVS was visualized as three service blueprints. The blueprints capture the content of the service and give the structure to be used in later writing of the development specifications.

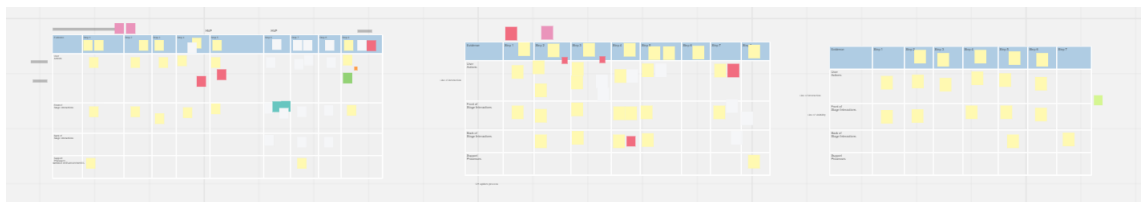


Figure 25: Three Service Blueprints were designed

Development specifications were written by the thesis writer as user stories for first part of MVS to later be reviewed together with software developers. User stories as a method were introduced in detail in chapter 5.2. The contents of user stories are excluded from the thesis, thus in this thesis only the process of how the design is delivered to the developers in a user-centric method, is described.

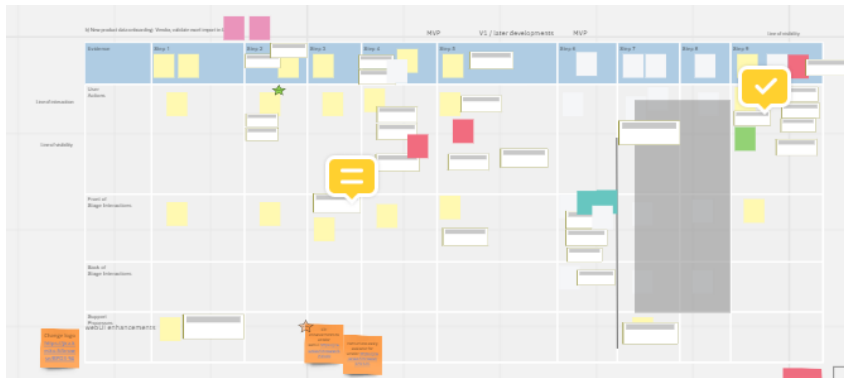


Figure 26: User stories were written based on service blueprint structure

This phase of the development project marked the end of the thesis scope. Hence, the thesis scope included the PIM supplier portal service concept, MVS requirements as service blueprints and establishing the process of documenting the detailed specifications as user stories based on service blueprints as the guiding service structure.

User stories were part of existing development practices in the Development Program. However, in this thesis the user stories were written based on a user-centric service structure, service blueprints, which capture the movement the user undertakes while traveling through the service towards their goal. Service blueprints were a new method for the Development Program. From the service blueprint, the user stories were copied to an existing platform which was used in the existing development practices by the Development Program.

7.2 Answers to the guiding questions based on the case study

Three guiding questions were guiding the work throughout the process. The answers to the guiding questions are presented next.

How do we co-create most value with service partners through a digital portal?

According to S-D Logic, the motivation for actors to engage with the service exchange process is to enhance the actor's own viability (Lusch & Vargo 2014, 92). Similarly, according to SL, by using the service the service user aims to enhance its own processes (Grönroos 2015, 13; Grönroos & Gummerus 2014, 208). This is also the aim of the PIM Supplier Portal. Both internal and external service users should benefit from using the service as their own product information management related processes become enhanced. Product information is co-created through using the service for a purpose which will ultimately serve the need of both: enable business functions.

Based on the introduced theories, value potential for a novel service is increased if co-creation is embedded into the design process. If service users are not involved in development process, the eventual service might or might not provide them value (Grönroos & Voima 2013, 146). Instead, co-creation contributes to designing a service which meets the user needs (Oertzen et al. 2018, 642) and allows to make design decisions based on real user insights (Thomas 2020, 227).

Value co-creation can be promoted by allowing service users actively participate to the service provider's development process (Grönroos & Voima 2013, 141). To answer the first guiding question, the thesis writer concludes that co-creation during the design process and engaging users into development of a digital portal will contribute to co-creating most value through the portal in the future.

Utilizing design thinking allows the service provider (the case company) to target efforts into solving the right problems for users and by doing so, increase the potential value of the service. Understanding user context and goal are essential in designing services which will be used and valued. Service design offers design tools such as service blueprints and user personas which help keep service user in the heart of user-centric development activities.

How do we understand the service context and the future role of the digital portal in it?

Previous research acknowledges that PIM system development context is complex, due to variety of related systems and user groups with different needs. This was also evidenced in this study as there were differentiating user needs between two user groups both presenting the case company, as well as different practices across the organization, which was identified in the interviews and focus group and while collecting the early feedback of the service proposition.

As a result of this case study, points for improvement in the current product information sharing processes were identified, confirming the business hypotheses of the case company that a PIM supplier portal could create value for users by enhancing related processes. Thus, PIM supplier portal can potentially benefit its users through process efficiency. User needs were identified in the areas of manual tasks, processes and communication, cognitive load, and developing the mutual business, which were turned into a Service Concept aiming to answer those needs.

Moreover, it was discovered that both internal and external service users (the case company employees and suppliers) would benefit from enhanced facilitation of collaboration in product information management context. Delivering and receiving product information contains many aspects in addition to the practical task of submitting and managing product information. Examples of such additional aspects are coordinating tasks among employees and

remembering to get back to pending tasks. The potential benefit of a PIM supplier portal thus reaches beyond the data sharing activities as such but touches upon the service context on a larger perspective.

Answering the second guiding question it can be stated that the context of PIM supplier portal development is complex. The needs of different stakeholder groups vary and PIM systems themselves exist in a complex network of product information related systems. In addition, information asymmetry provides practical implications to consider while developing a system for product information sharing between organizations.

PIM supplier portal as a future service is something users aspire and look forward to. The interviewed users identified many practical benefits that could be provided by a PIM supplier portal. Eventually the future role of the service can be the facilitator of collaboration between the stakeholders in product information sharing context by increasing process fluency, transparency and coordination while providing user guidance. These were also the four categories of the Service Concept which was designed.

What needs could be met in MVS, and how should we prioritize the needs in MVS and project roadmap?

After the discovery phase the thesis writer analyzed the data and processed it by creating service blueprints covering the core functions. Service blueprinting visualized the features of the PIM supplier portal in minimum form, which is required for the service to occur and replace some existing processes. The MVS was targeted to initially serve two user personas.

During the design process, various development needs and ideas were gathered from future service users. Stickdorn & Schneider (2012, 182) point out that the input gathered in co-creative sessions can be used and processed further in the design process, but that the ideas and suggestions from the sessions may not be used as such. In addition, Patton (2014, 29) reminds that prioritizing the items left for the future roadmap should be done based on the desired *benefits* instead of *features*. The thesis writer suggests the case company to critically evaluate the benefit of the collected development ideas on the roadmap based on real user feedback, which can be done based on implemented MVS. Since the user ideas which were collected during the design process are not connected to any existing service, it might be that only part of them will provide additional benefit for service users once MVS is in place, as new ways of working will be established.

Easiness of use should be considered already as a part of MVS and prioritized in future development. This was expressed by the research participants and supported by Wirtz & Lovelock (2018, 257), who state that self-service portals should be designed to be “fool-

proof”: the system should be easy to understand and use and the users should be able to help themselves out of un-wanted situations.

Answering the third guiding question, the thesis writer concludes that iteration and user feedback will be required throughout the development process following design thinking, service design and user-centered design ideal. Hence, the evaluation of future items and their significance from service value perspective is something the designers need to involve user input. MVS can be used as a test to evaluate the features and prioritize the future development items based on real user input rather than assumptions of the designers.

7.3 Discussion

As design thinking is suitable for abstract problems (Curedale 2016, 19, Luchs 2015, xxii), it was applied in the case study. By identifying and solving the right problems and empathizing with service users and their context, the likelihood for desirable service will increase. However, Przybilla, Klinker, Lang, Schreick, Wiesche and Krcmar (2022) point out that in addition to strengths, there are also certain weaknesses in applying design thinking into digital innovation.

Previous literature and research (Roehl-Anderson 2010, Battistello 2021, Abraham 2014) has indicated problems in PIM system project scoping, resulting in exceeded timelines and budgets. Przybilla et al (2022, 1646) observed that without a prototype it is hard to estimate required development efforts. In this thesis only service proposition was utilized to collect early user feedback, but the thesis does not include a prototype, which would better assist estimating the development efforts. Hence, estimating how much time and resources the development of the Service Concept or MVS will take, could turn out challenging without a prototype.

According to Curedale (2016, 29), prototyping should be started with low-fidelity, and progress through iteration towards high-fidelity. In software development, which the PIM supplier portal represents, the intangible essence of digital features can be difficult to capture as a low-fidelity prototype. Nevertheless, building an actual feature in order to test it contradicts design thinking approach. (Przybilla et al 2022, 1646.) It seems that in order to estimate the required resources, close collaboration with the software developers is a necessity, and investing time into prototyping could be useful.

The thesis writer herself struggled while trying to visualize the service so that early feedback could be gathered on idea-state. Early user feedback was gathered based on a list of features rather than actual service prototype. The thesis writer believes that as the employees had to rely on their own imagination of how the features could be implemented in practice when giving feedback about them, the item of evaluation was abstract and subjective. In hindsight,

story boards could have been another option to iterate the service idea to users, instead of the service proposition which was used.

According to design thinking, early and frequent testing is still the best way to keep the development proceed to right direction. That is also because, the further the development has proceeded, the harder it can be to make radical changes. When in doubt, whether the product is ready to be tested or not, the answer is most possibly the same: test it. (Karn, K. 2015, 22.) The thesis writer believes that collecting early user feedback already on an idea-level was useful even without an actual prototype, as the service proposition was enhanced based on the feedback. In addition, collecting feedback provided transparency to the on-going design process.

The thesis writer considers that approaching PIM supplier portal from service perspective justified focusing on the service user context, which resulted in revealing the underlying motivation and need for the self-service which was *enhancing the collaboration*. The thesis writer considers this to be an important finding: self-service is does not only mean doing things by yourself but doing things more efficiently together. Despite the modern self-service technology, as Polaine et al. (2013, 22) state, service is essentially about interaction between people.

To conclude, self-service portals do not make service providers and service users separate from each other; instead, the portals are only one element in building the relationship between the service provider and service user and creating the service experience. (Polaine et al. 2013, 36; Scherer et al. 2015, 5.) The results of this case study support this view and the designed Service Concept aims to tackle the needs for enhanced collaboration in product information sharing context.

Next steps for the development project

Service design approach helps reduce the risk of users failing to adopt the new service, as the user viewpoints are incorporated already into the service concept which is later iterated and validated with users before the service is launched (Reason et al. 2016, 117). This approach will be utilized throughout the development process, aiming to create a value-providing service through an intuitive user interface.

The case company has adopted an agile development model. Hence, design thinking, service design and user-centric development approach which were utilized in this thesis, will be continued with agile development approach to complete the double diamond's last part, "Deliver". Involving end-users and pursuing feedback-based iteration in development process is typical for agile software development (Wautelet et al 2017, 159), which provides a natural continuation for the conducted design process. MVS refinement still requires both co-

operation with the technical experts, collaborating with the users and eventually user testing, which will later confirm the true minimum level of service which is experienced as valuable and desirable.

In addition to finding the answers to the guiding questions, the empirical part of the research built the foundations for the development work about to begin. As a part of the initial design process which was user-centric, the underlying structure for the whole upcoming system development was created in the form of service blueprints. This approach sets a user-centric focus to upcoming service development.

The user personas which were created as a part of the design process crystallize the user needs revealed during the research. They will be used in the future development work as well. As this thesis is being finalized in the fall 2022, a project team has formed around the development task, continuing to build the service.

Limitations of the study

As this case study is a qualitative study in which interview data analysis was done using content analysis, the conclusions and design decisions are subjects to the subjective interpretation of the thesis writer. To reduce the bias, the design decisions were based on the data gathered in the discovery phase as well as the presented theories. Early concept draft was iterated back to users and the eventual Service Concept was validated against the research data to tackle thesis writer's own assumptions. In addition, further co-creation with users as well as the system developers will be a priority in future development of the project.

A pitfall of the design process is found from the lack of external triangulation. The thesis writer did the service concept planning without a team due limited resourcing and simultaneous projects. From design perspective this was not ideal due to possible bias but also the ideation was limited to the thesis writer's own efforts and creativity. To avoid the bias as much as possible, the research data was re-visited several times during the design process.

The valuable insights, such as latent user needs, can be revealed with open-minded approach. Bias can limit revealing these, if the research is influenced by previous knowledge such as identified technological limitations (Luchs 2015, xxiv). The service provider for the PIM supplier portal was already selected by the case company before the time of the research, and the thesis writer had experience from working with the same software. It shall be acknowledged that the past experiences of working with the selected software might influence how the research data was interpreted by the thesis writer. Having an open-minded approach in the interviews and focusing on understanding the context was an effort to mitigate possible bias.

During the process, the thesis writer has considered RCR guidelines (2012) and the Ethical Recommendations for Thesis Writing at Universities of Applied Sciences (Arene 2020). Both of these emphasize the ethical considerations related to research. The identities of research participants are not revealed in the thesis and the thesis writer has been striving for excluding any information which might enable indirectly identifying individuals taking part in the research (Arene 2020, 20).

The case company is anonymous based on the case company's request. The case company considers parts of the thesis to include confidential information, thus they can't be published in this thesis. The thesis writer has worked towards providing the audience necessary transparency to the design process while protecting the sensitive information based on the request of the case company. The commissioner has reviewed this thesis and given the consent to publish it.

Transferability of the results

The thesis is a case study, and it is focusing on the context of the case company. The thesis writer believes that the Service Concept and user personas would not be transferable to other company context as such, as they reflect the needs of the case company and its suppliers within the specific context of their collaboration.

However, the thesis writer thinks the answers to the guiding questions as well as the discussion of this thesis might be of interest to other organizations working with PIM system development. As modern PIM systems are expected to offer self-service portals (Jewell & Maddox 2021, 2), the thesis writer believes that user-centric approach in designing them can provide benefits. Applying design thinking, service design and user-centric development approach to PIM system development contributes to designing desirable services, which could create competitive advantage in the growing market of PIM.

7.4 Reflection

As the modern commerce keeps setting more requirements for product information quality and PIM systems, the thesis writer believes that user-centricity and service design can provide an approach for keeping users in the heart of system development. With the modern technology, it is possible to help PIM system users to accomplish their product information management related goals efficiently and pleasantly, which can also contribute to the success of the organization they represent. When user needs are prioritized in system development, the likelihood for designing a desirable system and service increases.

The objective of the thesis was to identify MVS requirements. MVS was illustrated using service blueprints. However, the road leading to MVS as blueprints and eventually user stories

was relatively long. During the design process the thesis writer learned, that service design tools and design thinking were well suited for concept-level development, but in order to slice the concept down to detailed software development specifications user-centric development approach was added to the thesis framework extending the thesis scope.

The initial project brief was seemingly straight-forward. During the design process the challenge became refined, and the perspective changed; not only was there a digital tool to be designed for product information sharing, but a service concept to facilitate the collaboration between the stakeholders. The thesis writer thinks, that when design thinking and service design are applied to problem solving, one should be prepared to reformulation of the original problem and even a change in project scope.

Lusch & Vargo (2014, 64) suggest, that considering goods as assets used to deliver service, will contribute towards possible innovations in design. In this thesis, adopting a service perspective allowed the thesis writer to understand that information sharing is only one element in a wider service exchange process between actors, which essentially is about collaboration aiming to enhance the stakeholders' own processes.

A topic for further studies could be, how the end-customer requirements are reflected in PIM system development processes. After all, a key purpose of product information stored in PIM system is to optimize the decision-making process for the end-customers in different sales and marketing channels. Thus, the question of how their needs are - or how they should be - manifested in PIM development projects, would be an interesting topic to study further.

S-D logic suggests that an actor can't deliver value to another actor as such, thus actors should aim to innovate new ways to co-create value (Lusch & Vargo 2014, 145). The time spent with future users of the service and hearing their views, needs and ideas has been not only useful but personally inspiring. The richness of views, experiences and ideas kept strengthening the mindset that co-creation is the key to success in designing meaningful services.

Writing the thesis has been a true learning experience, which has allowed the thesis writer to utilize newly adopted design skills into practical development work. Despite all the learnings during the thesis process, the most awarding experience for the thesis writer has been collaborating with people. A special thank you is dedicated to the case company representatives, the Program Owner and Co-Designer, who open-mindedly welcomed new design tools to be used in the development work. The thesis writer wishes that this case study will contribute to more fluent and easy product information management processes for the case company employees and its suppliers.

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Appendix 1: Interview guide, case company employee interviews

Introduction (5 min):

This interview is a part of a project aiming to develop a new PIM supplier portal. Service design methods are utilized in this project, which means that the user needs guide the development from the beginning.

The planning phase of the project, which this interview is a part of, is a part of my service design studies' Master's thesis. This interview is confidential and anonymous, and your name will not be mentioned in the thesis publication.

Planning of the portal begins with these interviews, which aim to gather understanding of how the work of future users of the portal is like and what kind of user needs there are. This understanding is a prerequisite for a successful planning. Information gathering continues in the project later as well. Thank you for taking part!

The interview questions are mainly related to product information and the process of gathering it. I am interested in hearing your thoughts and experiences on the topic, and there are no wrong or right answers.

You can interrupt me at any time and ask for clarification. The interview is informal.

I will record this interview call to make the notes after this meeting. No one else has access to the recording. Is this ok for you?

Do you have any questions at this point? Are we ready to start?

Background questions (5 min):

- What type of work do you do, how would you describe it?
- What is the role of product information in your work?
- What type of product information do you work with? (e.g. basic product data, enriching data, prices, product life cycle management etc)

Questions related to product information management (20 min):

- How would you describe your role in new product creation process
 - o How is this process initiated, is someone responsible for this process, who?
- How would you describe the process of how new products are currently created?
- How is the collaboration like with the suppliers regarding product information when new products are created?
 - o **How is the information quality? How often do you need to edit it?**
- What type of information do you need from suppliers when you update products?
- Thinking about the role of suppliers in delivering product information in general, what is currently working well?
- Thinking about the role of suppliers in delivering product information in general, is there something that frustrates you or is difficult?

Questions related to future (15 min):

- In the future, how would you like to see the role of suppliers in delivering and maintaining product information?
- In the future, how would you like to see your own role related to gathering product information?
- In which ways you believe a PIM supplier portal could help you in your work?

- How would an ideal PIM supplier portal be like?
- What kind of wishes do you have regarding the development work with PIM supplier portal?
- **Which suppliers in your opinion would be good to be interviewed regarding this project? How would you prefer them to be approached?**

We have now gone through all questions I had in mind. Is there something we did not cover yet, that you would like us to discuss?

It is possible, that after this interview something comes to mind that you would like to bring up. If so, please contact me by email or Teams.

I would like to thank you for your time. The interview has provided a lot of valuable information.

Questions related to previous service:

Now that we are planning a PIM supplier portal, we want to document learnings from the previous service. This part of the interview will be used in a separate document. The learnings can be technical details or something related to the culture and ways of working, which might help in building a PIM supplier portal which responds to user needs. Thus it is very valuable to hear experiences related to the previous service. Based on the interviews a separate document is written, which you can then access and comment on. Would you like to ask anything about this matter?

- How was your role regarding using or developing the previous service?
 - o If participated in development work: how was the collaboration with the service provider like? When did the project start? When was the service taken into use? How was the training organized? How was the change communicated to stakeholders?
- Please describe how you used the service (how often, for which information, did they assist other internal or external users)
- How was it like to use the service?
- Did the service make your work easier? How?
- Which were the biggest benefits from using the service?
- What did you like about in the service?
- Was there something missing from the service, that you would have found useful?
- Was there something about using the service that you were frustrated about?
- What do you believe was the reason for suppliers to use the service?
- All suppliers did not use the service. Why do think this was the case?
- In your opinion, what can we learn from the previous service and utilize in developing a PIM supplier portal?

(Translated from Finnish by the thesis writer)

Appendix 2: Interview guide, supplier interviews

Introduction (5 min)

This interview is a part of a development project, where the process of delivering product information is enhanced as a part of system development work. The case company wants to increase the understanding of your processes related to product information management, so that the case company can improve the product information delivery process in a way which serves your needs.

As a part of my Master's studies in the field of service design, I am writing a thesis. The thesis is concerning the topic of improving the processes related to delivering product information to the case company. This interview is part of the thesis research. The data collected in this interview is handled anonymously and an individual interviewee can't be identified from the thesis. (pause)

As an interviewer I am interested in hearing about your experiences and views. Thus, there is no right or wrong answers to my questions. I have pre-defined questions I will present, but the interview follows a free format.

I would like to record this interview so that I can make notes after we have ended the call and can concentrate on listening your answers during our call. Is this ok for you?

Do you have any questions at this point? Are we ready to start?

Background questions (10 min):

- Please tell me about your work.
- What role does product information play in your work?
- What type of product information do you work with? (e.g. marketing, prices...)
- How have you organized product information management in your organization? (Is pricing separated from other product information management? How about marketing texts?)

Questions related to sharing product information (40 min):

- When you open products for the case company, what is the process like in practice? (Ask for more; how is the decision made, what information is needed initially, is there a specific person in charge of the process)
- How is the pricing process like from your point of view (e.g. pricing structure, pricing changes?)
- How well do you feel you are familiar with the product information related requirements of the case company, such as basic information, images, documents and prices?
- When you think about the current way of delivering product information to the case company, what is working well?
- When you think about the current way of delivering product information to the case company, what or which parts of it are challenging?

- How well do you feel you are aware of what information the case company has about the products supplied by your company? (Ask for more; do they wish any changes in this matter)
- How do you see the current timelines set by the case company for delivering product information? (Ask for more; is the interviewee aware of schedules, what causes possible challenges)
- You likely deliver product information to several partners or customers, that might have different requirements compared to the case company. How would you describe the overall situation from your perspective?
- Are there any practices related to product information sharing, that you have found useful and have made your work easier? (Ask for more; any examples of good practices, are direct integrations in use)

Questions related to the future (20 min):

- So that in the future it would be easy and convenient to deliver product information to the case company, what should change at least?
- If you could envision as easy method to deliver product information to the case company as possible, how would it be like?
- In the future, it might be possible for you to deliver product information to the case company using a digital portal. In your opinion, how would an ideal portal be like? (Ask for more information and details of the ideal portal)

Questions related to the previous service:

- Did you use the previous service?
- How was it like to use the previous service?
- Did using the service make your work easier? How?
- Were there any challenges in using the service?

Interview ends

Are you interested in testing a new PIM supplier portal or other tool in the future, and do you wish to be contacted for it?

We have now gone through all the questions that I had in mind. The information will be used as a background material in development work.

Is there anything you would like to add at this point? Do you have any questions? In case something will come to mind after this interview, please be in touch. Once more, I would like to thank you for your time.

(Translated from Finnish by the thesis writer)